

# Instruction Manual

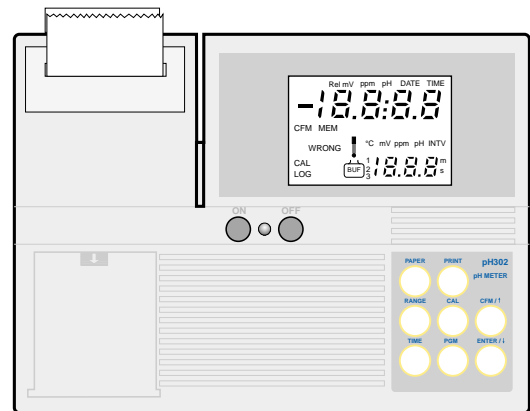
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**pH 300**

**pH 301**

**pH 302**

**Microprocessor  
GLP Bench-top  
pH/mV/ISE/°C Meters**



Dear Customer,  
 Thank you for choosing a Hanna Instruments Product.  
 Please read this instruction manual carefully before using the instrument.  
 This manual will provide you with all the necessary information for the correct use of the instrument, as well as a precise idea of its versatility in a wide range of applications.  
 These instruments are in compliance with CSA, UL and **CE** (EN 50081-1 and EN 50082-1) directives.

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**PRELIMINARY EXAMINATION**

Remove the instrument from the packing material and examine it to make sure that no damage has occurred during shipping. If there is any damage, notify your Dealer.

Each pH meter comes supplied complete with:

- **HI 1131B** glass-body combination pH electrode
- **HI 7669/2W** temperature probe
- **HI 3131B** glass-body platinum ORP electrode
- pH 4.01 & 7.01 buffer solutions (20 mL each)
- 12VDC adapter (**HI710005** or **HI710006**)
- 5 paper rolls (**pH 302** only)

The KIT version includes also:

- **HI76405** electrode holder
- **HI 92000** Windows® compatible application software
- **HI 920010** PC connection cable
- Storage, cleaning and electrolyte solutions

**Note:** Save all packing material until you are sure that the instrument functions correctly. All defective items must be returned in the original packing with the supplied accessories.

**GENERAL DESCRIPTION**

Hanna Instruments **pH300**, **pH301** and **pH302** are professional bench-top pH meters for pH, ORP (Oxidation Reduction Potential), ISE and temperature measurements. Their built-in microprocessor ensures accurate and user-friendly operation.

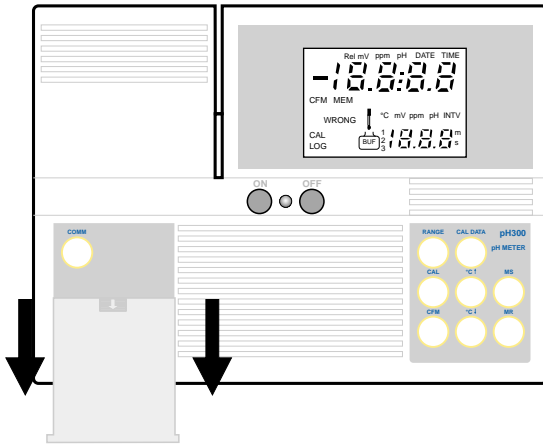
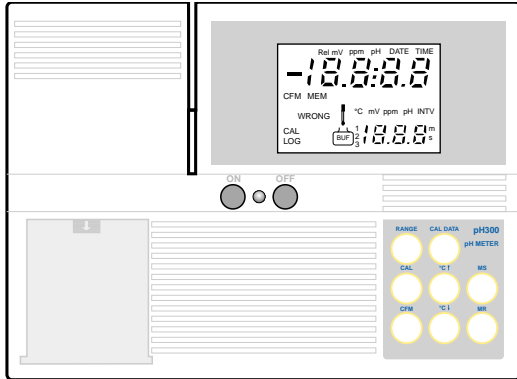
pH measurements are automatically compensated for the temperature effect (ATC).

These meters come equipped with a large, easy-to-read LCD which shows the pH or mV or ION (for **pH301** only) with temperature simultaneously. The display has graphic symbols to make the calibration procedure easy to follow. Calibration is not allowed until the electrode has stabilized to ensure accurate measurements.

Through the RS 232 serial port you can transfer sample measurements to a PC.

## FUNCTIONAL DESCRIPTION pH 300

### THE FRONT PANEL



- **ON** to turn the meter on
- **OFF** to turn the meter off
- Power LED to confirm the meter is on

### Keyboard on the Left

- **COMM** to display the current baud rate for RS232.

### Keyboard on the Right

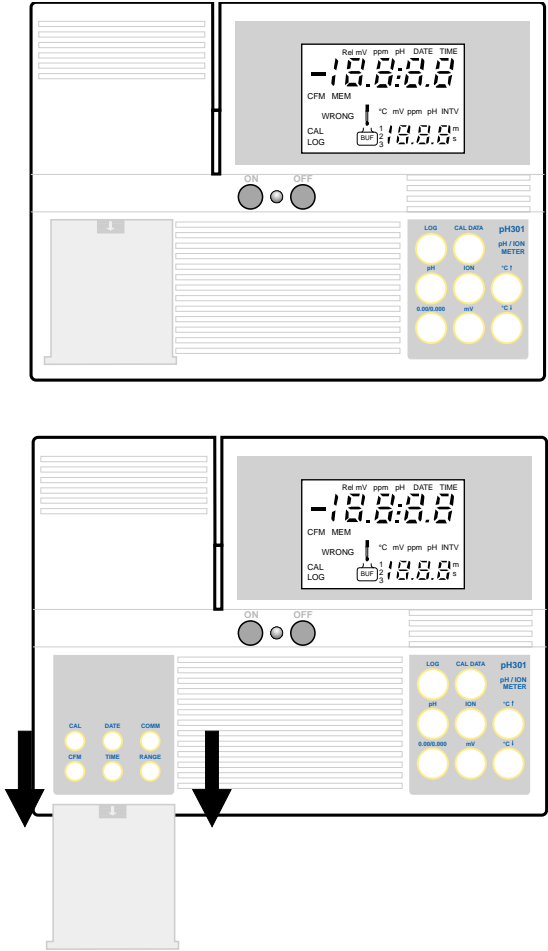
- **↑°C** and **↓°C** to manually set temperature (when the temperature probe is not connected) and to select the calibration buffer, the baud rate, the command prefix.
- **CAL** to enter and exit the calibration mode. After the pH calibration, to enter the calibration date, use this key to toggle between month, day and year.
- **CAL DATA** to display the date of last pH calibration. This also displays the offset and the slope values expressed in mV.
- **CFM** to confirm calibration values and to confirm baud rate and command prefix during communication setting mode.
- **MR** to recall the stored value.
- **MS** to hold and memorize the measured value. The last reading will be frozen on the display until the key is released. At the same time this reading is stored in the memory.
- **RANGE** to select the measurement range (pH or mV).

## SPECIFICATIONS pH 300

|                                 |                                                    |                                                                                  |
|---------------------------------|----------------------------------------------------|----------------------------------------------------------------------------------|
| <b>Range</b>                    | <b>pH</b><br><b>ISE</b><br><b>ORP</b><br><b>°C</b> | 0.00 to 14.00<br>±399.9 mV<br>±1999 mV<br>-9.9 to 120.0                          |
| <b>Resolution</b>               | <b>pH</b><br><b>ISE</b><br><b>ORP</b><br><b>°C</b> | 0.01<br>0.1 mV<br>1 mV<br>0.1                                                    |
| <b>Accuracy (@20°C/68°F)</b>    | <b>pH</b><br><b>ISE</b><br><b>ORP</b><br><b>°C</b> | ±0.01<br>±0.2 mV<br>±1mV<br>±0.5                                                 |
| <b>Typical EMC Deviation</b>    | <b>pH</b><br><b>ISE</b><br><b>ORP</b><br><b>°C</b> | ±0.01<br>±0.6 mV<br>±1 mV<br>±0.5                                                |
| <b>pH Calibration</b>           |                                                    | Automatic 1 or 2 points with 3 memorized buffers (4.01, 7.01, 10.01)             |
| <b>pH Offset</b>                |                                                    | Max ±60mV or ±1pH                                                                |
| <b>pH Slope</b>                 |                                                    | 70-108%                                                                          |
| <b>Temperature Calibration</b>  |                                                    | Automatic 1 or 2 points with 2 memorized values (0 and 50°C)                     |
| <b>Temperature Compensation</b> |                                                    | Automatic or manual from -9.9 to 120°C (14 to 248°F)                             |
| <b>Electrode</b>                |                                                    | <b>HI 1131B</b> glass body combination refillable pH electrode <b>(included)</b> |
| <b>Temperature probe</b>        |                                                    | <b>HI 7669/2W</b> with 1 m (3.3') cable <b>(included)</b>                        |
| <b>Input impedance</b>          |                                                    | 10 <sup>12</sup> Ω                                                               |
| <b>Computer Interface</b>       |                                                    | RS 232 (optoisolated)                                                            |
| <b>Power supply</b>             |                                                    | 12 VDC (CSA, UL & CE approved)                                                   |
| <b>Environment</b>              |                                                    | 0 to 50°C (32 to 122°F); 95% RH                                                  |
| <b>Dimensions</b>               |                                                    | 280x200x75mm (11x7.9x3")                                                         |
| <b>Shipping Weight</b>          |                                                    | 1.3 kg (2.9 lb.)                                                                 |

## FUNCTIONAL DESCRIPTION pH 301

### THE FRONT PANEL



- **ON** to turn the meter on
- **OFF** to turn the meter off
- **Power LED** to confirm the meter is on

### **Keyboard on the Left**

- **CAL** to start the calibration mode for pH, mV and ION. To set or quit the date or time setting mode. Used also during logging (to start logging press pH, mV or ION plus LOG plus CAL key; to stop logging press LOG plus CAL key).
- **CFM** to confirm calibration values.
- **COMM** to display the current baud rate and command prefix for RS232.
- **DATE** to display the date.
- **RANGE** to display the calibration buffer or the temperature on the secondary LCD during calibration. During setting of the date, to toggle between month, day and year. During setting of the time, to toggle between minutes, seconds and logging interval.
- **TIME** to display the time.

### **Keyboard on the Right**

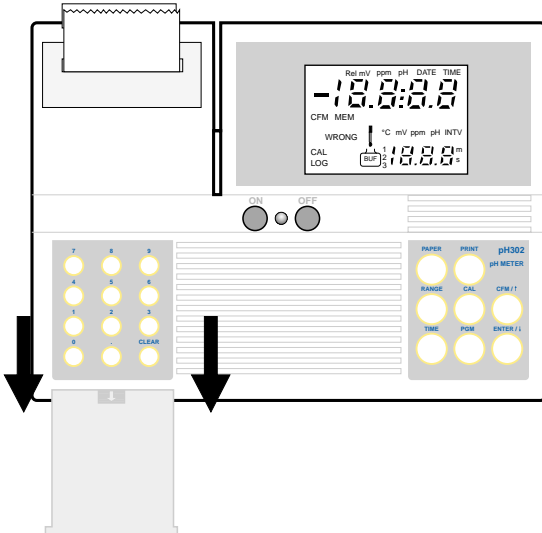
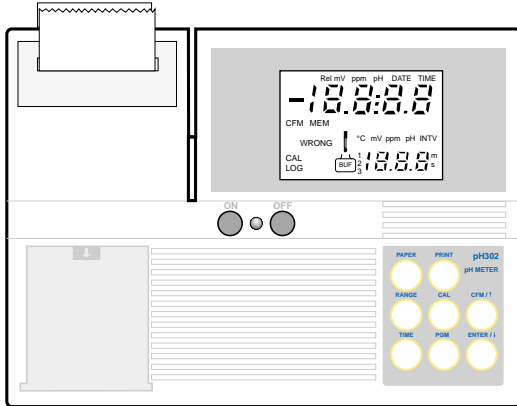
- **↑°C** and **↓°C** to manually set temperature (when the temperature probe is not connected) and to select the calibration buffer, the date and time, the baud rate, the command prefix.
- **CAL DATA** to display the date of last pH calibration. This also displays the offset and the slope 1 or slope 2 values expressed in mV.
- **ION** to select the ION measurement range.
- **mV** to select the mV measurement range.
- **pH** to select the pH measurement range.
- **.00/.000** to select two or three decimal points for pH measurements.

### **SPECIFICATIONS pH 301**

|                                 |                                                                          |                                                                                                                                                 |
|---------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Range</b>                    | <b>pH</b><br><b>mV</b><br><b>ppm</b><br><b>°C</b>                        | -1.999 to 19.999<br>±1999.9<br>0.001 to 19999<br>-9.9 to 120.0                                                                                  |
| <b>Resolution</b>               | <b>pH</b><br><b>mV</b><br><b>ppm</b><br><br><br><b>°C</b>                | 0.01 or 0.001<br>0.1<br>0.001 (from 0.001 to 9.999)<br>0.01 (from 10.00 to 99.99)<br>0.1 (from 100.0 to 999.9)<br>1 (from 1000 to 19999)<br>0.1 |
| <b>Accuracy</b>                 | <b>pH</b><br><b>(@20°C/68°F)</b><br><b>mV</b><br><b>ppm</b><br><b>°C</b> | ±0.002<br>±0.1 (±799.9) / ±0.2 (±1999.9)<br>±0.5%<br>±0.5                                                                                       |
| <b>Typical EMC Deviation</b>    | <b>pH</b><br><b>mV</b><br><b>ppm</b><br><b>°C</b>                        | ±0.01<br>±0.3<br>±1%<br>±0.5                                                                                                                    |
| <b>pH Calibration</b>           |                                                                          | Automatic 1, 2 or 3 points with 6 memorized buffers (1.68, 4.01, 6.86, 7.01, 9.18, 10.01)                                                       |
| <b>pH Offset</b>                |                                                                          | Max ±60mV or ±1pH                                                                                                                               |
| <b>pH Slope</b>                 |                                                                          | 70-108%                                                                                                                                         |
| <b>ppm Calibration</b>          |                                                                          | Automatic 1 or 2 points with 5 memorized buffers (0.1, 1, 10, 100, 1000)                                                                        |
| <b>ppm Offset</b>               |                                                                          | Max ±1999.9mV                                                                                                                                   |
| <b>ppm Slope</b>                |                                                                          | From ±20mV to ±100 mV [mV/log(0.001xppm)]                                                                                                       |
| <b>Temperature Calibration</b>  |                                                                          | Automatic 1 or 2 points with 2 memorized values (0 and 50°C)                                                                                    |
| <b>Temperature Compensation</b> |                                                                          | Automatic or manual (for pH only) from -9.9 to 120°C (14 to 248°F)                                                                              |
| <b>Electrode</b>                |                                                                          | <b>HI1131B</b> glass body combination refillable pH electrode ( <b>included</b> )                                                               |
| <b>Temperature probe</b>        |                                                                          | <b>HI 7669/2W</b> with 1 m (3.3') cable ( <b>included</b> )                                                                                     |
| <b>Input impedance</b>          |                                                                          | 10 <sup>12</sup> Ω                                                                                                                              |
| <b>Logging Interval</b>         |                                                                          | 1, 15, 30 seconds or 1, 5, 30, 60, 120, 180 minutes                                                                                             |
| <b>PC Interface</b>             |                                                                          | RS 232 (optoisolated)                                                                                                                           |
| <b>Power supply</b>             |                                                                          | 12 VDC (CSA, UL & CE approved)                                                                                                                  |
| <b>Environment</b>              |                                                                          | 0 to 50°C (32 to 122°F); 95% RH                                                                                                                 |
| <b>Dimensions</b>               |                                                                          | 280x200x75mm (11x7.9x3")                                                                                                                        |
| <b>Shipping Weight</b>          |                                                                          | 1.3 kg (2.9 lb.)                                                                                                                                |

## FUNCTIONAL DESCRIPTION pH 302

### THE FRONT PANEL



- **ON** to turn the meter on
- **OFF** to turn the meter off
- Power LED to confirm the meter is on

### Keyboard on the Left

- **0 to 9** for numeric and decimal data input.
- **CLEAR** to cancel wrong data entry during programming.

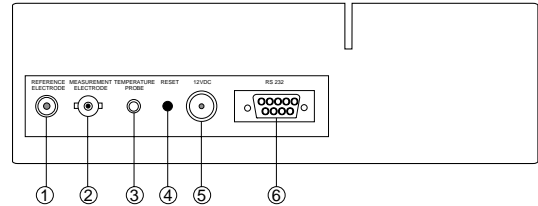
### Keyboard on the Right

- **CAL** to perform the pH, mV or temperature calibration.
- **CFM/↑** to confirm pH/mV/temperature calibration values or to manually set temperature (when the temperature probe is not connected).
- **ENTER/↓** to terminate the numeric data entry or to manually set temperature (when the temperature probe is not connected) or to select the buffer value during pH calibration.
- **PAPER** to pull the paper.
- **PGM** to select a program.
- **PRINT** to obtain a printout (prints time, date, sample number and pH or mV values).
- **RANGE** to select the measurement range (pH or mV) or to display the calibration buffer or the temperature on the secondary LCD during calibration.
- **TIME** to display the time and the date.

## SPECIFICATIONS pH 302

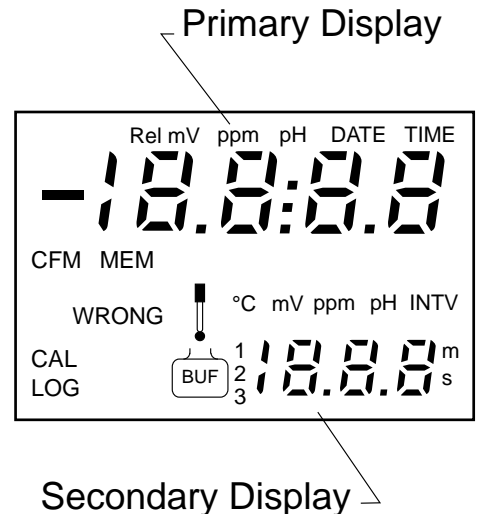
|                                               |                        |                                                                     |
|-----------------------------------------------|------------------------|---------------------------------------------------------------------|
| <b>Range</b>                                  | pH<br>ISE<br>ORP<br>°C | 0.00 to 14.00<br>±399.9 mV<br>±1999 mV<br>-9.9 to 120.0             |
| <b>Resolution</b>                             | pH<br>ISE<br>ORP<br>°C | 0.01<br>0.1 mV<br>1 mV<br>0.1                                       |
| <b>Accuracy</b><br>(@20°C/68°F)               | pH<br>ISE<br>ORP<br>°C | ±0.01<br>±0.2 mV<br>±1mV<br>±0.5                                    |
| <b>Typical EMC Deviation</b>                  | pH<br>ISE<br>ORP<br>°C | ±0.01<br>±0.3 mV<br>±1 mV<br>±0.5                                   |
| <b>pH Calibration</b>                         |                        | Automatic 1, or 2 points with 3 memorized buffers (4.01,7.01,10.01) |
| <b>Temperature Calibration</b>                |                        | Automatic 1 or 2 points with 2 memorized values (0and50°C)          |
| <b>Temperature Compensation (for pH only)</b> |                        | Automatic or manual from -9.9 to 120°C (14 to 248°F)                |
| <b>Electrode</b>                              |                        | HI 1131B glass body combination refillable pH electrode (included)  |
| <b>Temperature probe</b>                      |                        | HI 7669/2W with 1 m (3.3') cable (included)                         |
| <b>Input impedance</b>                        |                        | 10 <sup>12</sup> Ω                                                  |
| <b>Printer</b>                                |                        | Dot matrix, 44mm wide paper                                         |
| <b>Languages</b>                              |                        | English, German, French, Spanish, Italian & Swedish                 |
| <b>PC Interface</b>                           |                        | RS 232 (optoisolated)                                               |
| <b>Power supply</b>                           |                        | 12 VDC (CSA, UL & CE approved)                                      |
| <b>Environment</b>                            |                        | 0 to 50°C (32 to 122°F); 95% RH                                     |
| <b>Dimensions</b>                             |                        | 280x200x75mm (11x7.9x3")                                            |
| <b>Shipping Weight</b>                        |                        | 1.3 kg (2.9 lb.)                                                    |

## THE REAR PANEL



1. Reference Electrode Connector (Ø 4 mm)
2. BNC socket for measurement electrode
3. Socket for Temperature Probe
4. Reset Button
5. DC Power Socket (for HI710005 or HI710006)
6. RS 232 Connector

## LCD FUNCTIONAL DESCRIPTION



## OPERATIONAL GUIDE

### **ELECTRODE AND PROBE CONNECTIONS**

For combination **pH** or **ISE** or **ORP** electrodes (with internal reference) plug the electrode's BNC to the socket provided (see page 11).

For electrode with separate reference, connect the measuring electrode's BNC to the BNC socket and the reference electrode's plug to the socket provided (see page 11).

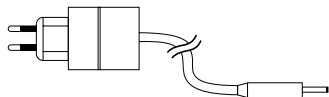
For **temperature** measurements and automatic temperature compensation connect the temperature probe to the °C socket (see page 11).

If the temperature probe is not connected, when turned on, the meter will display a default temperature of 25°C or the last recorded temperature (if the temperature probe is disconnected when the meter is on) on the secondary LCD. The "°C" indicator will be flashing.

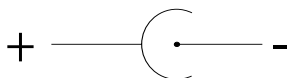


### **POWER CONNECTION**

Plug the 12VDC adapter (**HI710005** or **HI710006**) into the DC socket (see page 11). Plug the adapter to the mains.



**Note:** The instrument uses the following configuration.



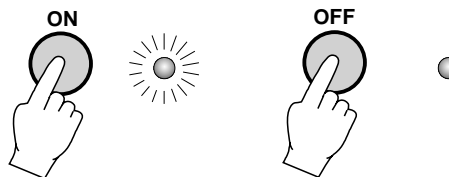
It is recommendable to use the Hanna **HI710005** or **HI710006** voltage adapters (sup-

plied with the meters) that use the proper polarity configuration.

The meters can also be used with other adapters. In this case, remember to check the correct polarity of your adapter before connecting it to the meter.

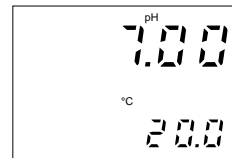
**Note:** Make sure the main line is protected by a fuse.

Press ON to turn the meter on. The power LED will remain lit until OFF is pressed to turn the meter off.

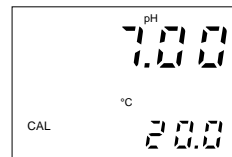


When the meters are turned on, the micro-processor checks if any calibration data is in memory (i.e. if the offset is within ±60mV and the slope between 70-108%).

If the calibration data is valid, the meter will operate in the normal measurement mode and default to pH measurement mode with the temperature on the secondary LCD.



If the calibration data is not valid or the calibration data is lost, the "CAL" indicator will be displayed to prompt the user to perform the pH calibration. If the user chooses not to perform the calibration and presses CAL to quit from the calibration mode, the offset and the slope of the instrument would be set to 0 mV and 100% respectively.





**pH300, pH301 and pH302** use an EEPROM to retain the pH calibration, mV calibration, temperature calibration as well as the serial communication setting. The instrument will store the respective data after a calibration or serial communication setting, even when it is not plugged-in.

***For pH 302 only***

**pH302** uses a rechargeable battery to retain the pH calibration data. It lasts approximately one month when fully charged. The battery is automatically charged any time the meter is plugged-in (either turned on or off).

If you need to unplug the instrument, press OFF before disconnecting the meter from the mains. Only in this case will the instrument retain the memorized data. Otherwise, the instrument needs to be re-calibrated.



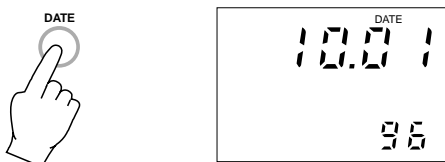
In the case of a power failure while the instrument is operational, re-calibration is required.

When the instrument is initially switched on, the microprocessor checks if any calibration data is in memory (i.e. if the offset is within  $\pm 1$  pH and the slope between 70 - 108%).

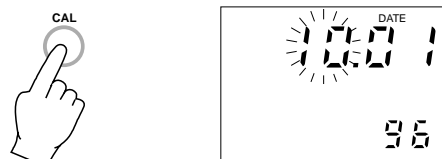
If the calibration data are not memorized, the offset and slope of the instrument will be set to 0 mV and 100% respectively.

**SETTING THE DATE AND THE TIME AND THE LOGGING INTERVAL (for pH 301 only)**

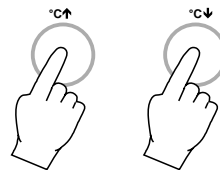
Press DATE to display the date. The month and the day will be displayed on the primary LCD, the year on the secondary one.



Press CAL to enter the setting mode and the month will be flashing.



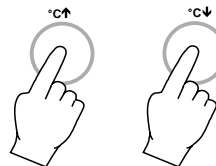
Use UP or DOWN to select the month.



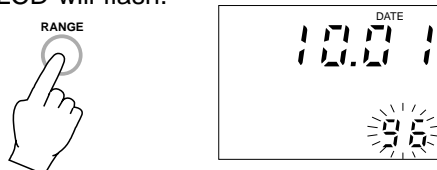
Press RANGE and the day will start to flash.



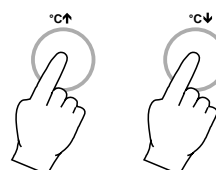
Use UP or DOWN to select the day.



Press RANGE and the year on the secondary LCD will flash.



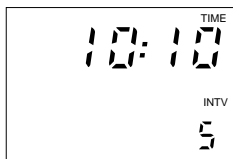
Use UP or DOWN to select the year.



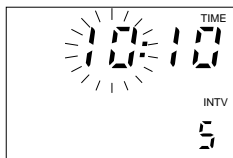
Press CAL to exit the date setting mode.



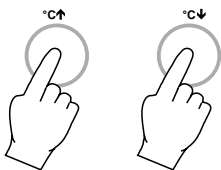
Press TIME to display the time. The hour and the minutes will be displayed on the primary LCD, the logging interval on the secondary one.



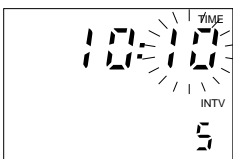
Press CAL to enter the setting mode and the hour will flash.



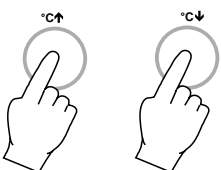
Use UP or DOWN to select the hour.



Press RANGE and the minutes will flash.



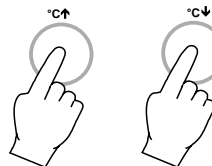
Use UP or DOWN to select the minutes.



Press RANGE and the logging interval on the secondary LCD will come up.



Use UP or DOWN to select the logging interval.

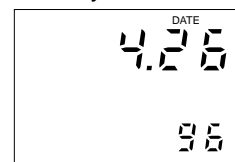


Press CAL to exit the time setting mode.

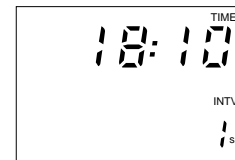


**VIEWING THE DATE AND THE TIME (for pH 301 only)**

Press DATE to display the date. The month and the day will be displayed on the primary LCD, the year on the secondary one.



Press TIME to display the time. The hour and the minutes will be displayed on the primary LCD, the logging interval on the secondary one.

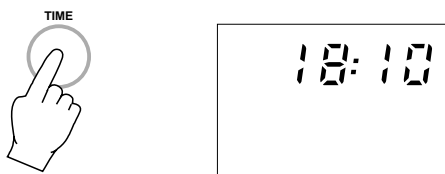


**SETTING THE DATE AND THE TIME AND THE LOGGING INTERVAL (for pH 302 only)**

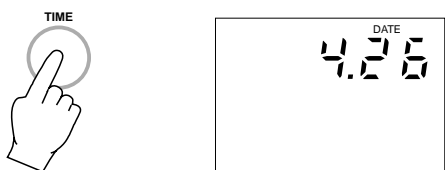
See program No. 1 (page 60).

**VIEWING THE DATE AND THE TIME (for pH 302 only)**

Press TIME to display the time (HH/MM).



Press TIME again to display the date (MM/DD).



**TAKING pH MEASUREMENTS**

Make sure that the instrument has been calibrated for pH before taking pH measurements (see page 29).

**For pH 300 and pH 302 only:**

Select the pH measurement mode by pressing RANGE.

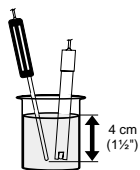


**For pH 301 only:**

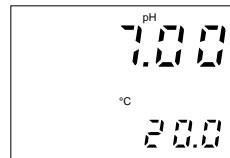
Select the pH measurement mode by pressing pH.



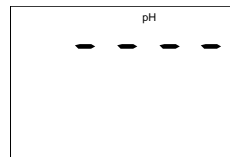
To take a pH measurement simply submerge the tip (4cm/ 1½") of the pH electrode and the temperature probe into the sample to be tested.



Allow 1 or 2 minutes for the electrode to stabilize.



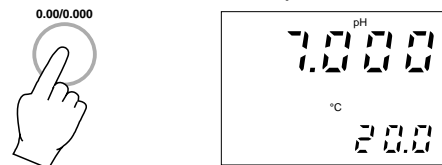
pH is displayed on the primary display and temperature on the secondary one.



If readings are out of range "---" will appear on the LCD display.

**For pH 301 only:**

Press the .00/.000 key to change the resolution from two to three decimal points.



It is recommended that the electrode is rinsed thoroughly for better conditioning. For this rinsing process, it is recommended to use a liberal amount of the sample to be measured.

If measurements are taken in different samples successively, it is recommended that the electrode and the temperature probe are rinsed thoroughly with deionized water or distilled water (if not available, tap water may also be used) and then blot dry between each measurement.

The pH reading is directly effected by temperature. In order for the meter to measure the pH accurately, temperature must be taken into consideration.

A perfect equilibrium between the pH electrode and the sample is reached in approximately 15 minutes.

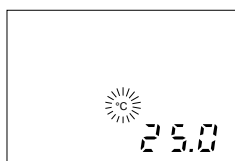
To use the meter's **Automatic Temperature Compensation** feature, submerge the **HI7669/2W** temperature probe into the sample

as close to the electrode as possible and wait for 1-2 minutes.

If you know the temperature of the sample to be tested you can compensate for it manually.

**If manual temperature compensation is desired the temperature probe must be disconnected from the instrument.**

The display will then show the default temperature of 25°C or the last recorded temperature reading. "°C" is blinking.

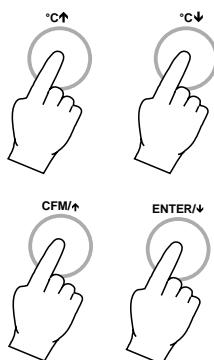


Note the temperature of the sample using a **ChecktempC** or a glass thermometer.



The temperature can now be adjusted with UP and DOWN.

If the temperature probe is connected to the meter, the secondary LCD figure displays the measured temperature reading and the "°C" indicator does not blink. Pressing UP or DOWN will not alter the temperature reading.



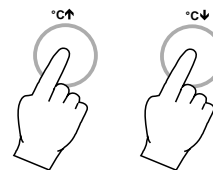
**VIEWING THE pH CALIBRATION DATA**

**For pH 300:**

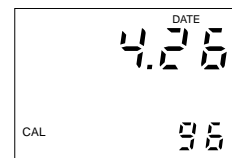
Press CAL DATA and the meter will display the **last pH calibration data.**



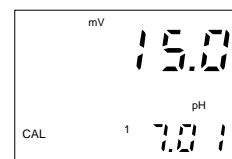
Press UP or DOWN to get this information in the following sequence:



a. Date of the last pH calibration (month, day and year)

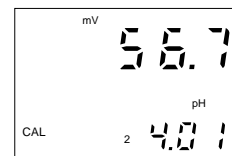


b. Offset calibration value expressed in mV and displayed on the primary LCD with the buffer used to calibrate the offset on the secondary LCD.



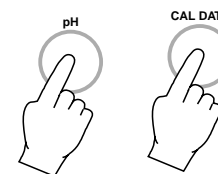
The offset pH value should be between ±30 mV. For values between ±30 and ±60 mV change the reference electrolyte and repeat the calibration procedure. For values higher than +60 mV or lower than -60 mV the electrode is no longer reliable. See the electrode maintenance section on page 84.

c. Slope calibration value directly expressed in mV/pH is displayed on the primary LCD with the 2<sup>nd</sup> buffer used to calibrate the offset on the secondary LCD.

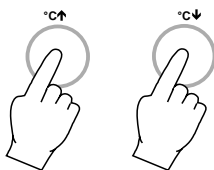


**For pH 301:**

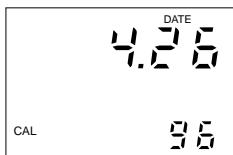
Press pH followed by CAL DATA and the meter will display the **last pH calibration data.**



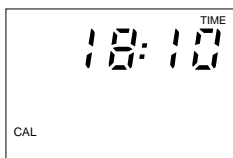
Press UP or DOWN to get this information in the following sequence:



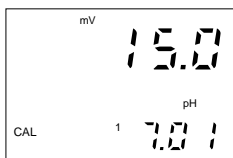
a. Date of the last pH calibration (month, day and year)



b. Time when the last pH calibration was completed (hour and minutes).

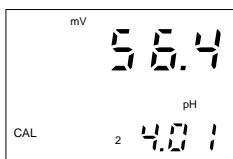


c. Offset calibration value expressed in mV and displayed on the primary LCD with the buffer used to calibrate the offset on the secondary LCD.

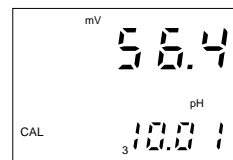


The offset pH value should be between  $\pm 30$  mV. For values between  $\pm 30$  and  $\pm 60$  mV change the reference electrolyte and repeat the calibration procedure. For values higher than  $+60$  mV or lower than  $-60$  mV the electrode is no longer reliable. See the electrode maintenance section on page 84.

d. Acid slope calibration value expressed in mV/pH and displayed on the primary LCD with the 2<sup>nd</sup> buffer used to calibrate the offset on the secondary LCD.



e. Alkaline slope calibration value expressed in mV/pH and displayed on the primary LCD with the 3<sup>rd</sup> buffer used to calibrate the offset on the secondary LCD.



**For pH 302:**

See program #3 (page 66).

**TAKING REDOX MEASUREMENTS**

**pH300, pH301 and pH302** have the capability to take ORP measurements. An optional ORP electrode must be used to perform these measurements (see page 105).

**For pH 300 or pH 302:**

To get into the mV mode (ORP), press RANGE.

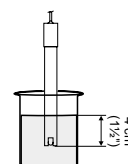


**For pH 301:**

To get into the mV mode, press mV.



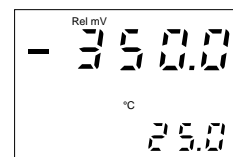
To measure the mV of a solution simply submerge the ORP electrode tip (4 cm/1½") into the sample to be tested. Allow a few minutes for the reading to stabilize.



The display will indicate the absolute mV value (positive or negative).

**For pH 300 and pH 302 only:**

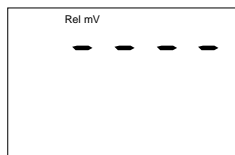
When values are less than  $\pm 400$  mV, tenths of mV are displayed; for values greater than  $\pm 400$  mV, the decimal digit disappears.



Note that the change in scale (from 0.1 mV to 1 mV as resolution) is automatic.

**For all models:**

"---" appears if the value exceeds  $\pm 1999$  mV (out of range).



Oxidation-reduction potential (REDOX) measurements provide the quantification of the oxidizing or reducing power of the sample tested.

To correctly perform a redox measurement, the surface of the ORP electrode must be clean and smooth.

When not in use, the tip of the electrode should be kept moist and safe from any mechanical stress which might cause damage to the gold/platinum junction.

**TAKING ION MEASUREMENTS**

**pH 300, pH 301 and pH 302** have the capability to take ION measurements. An optional ISE electrode must be used to perform these measurements.

**For pH 300 or pH 302:**

To get into the mV mode (ORP or ISE), press RANGE.

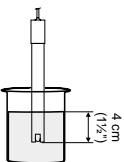


**For pH 301:**

To get into the ION mode, press ION.



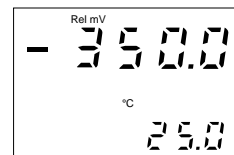
Simply submerge the ISE electrode tip (4 cm/1½") into the sample to be tested. Allow a few minutes for the reading to stabilize.



**For pH 300 and pH 302:**

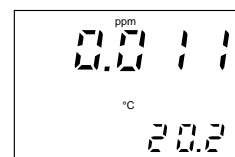
The display will indicate the absolute mV value (positive or negative).

When values are less than  $\pm 400$  mV, tenths of mV are displayed; for values greater than  $\pm 400$  mV, the decimal digit disappears. Note that the change in scale (from 0.1 mV to 1 mV as resolution) is automatic.



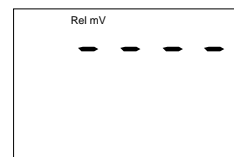
**For pH 301:**

The display will indicate the ppm value expressed in ppm or mV (depending on the measured sample). Note that the change in scale (from 0.001ppm to 0.01ppm or 0.1 ppm as resolution) is automatic.



**For all models:**

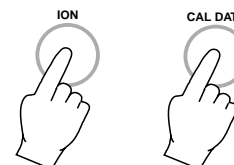
"---" appears if the value exceeds  $\pm 1999$  mV (out of range).



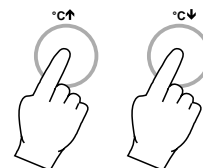
When not in use, the tip of the electrode should be kept moist and safe from any mechanical stress which might cause damage to the junction.

**VIEWING THE ION CALIBRATION FACTOR ON THE LCD (for pH 301 only)**

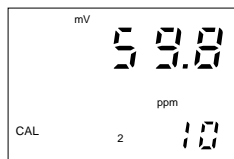
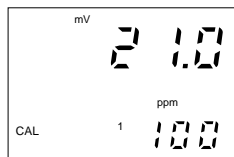
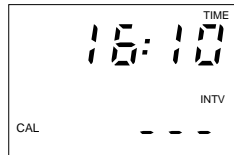
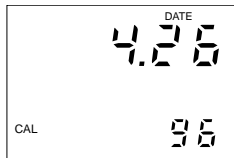
Press ION followed by CAL DATA and the meter will display the **last ION calibration data**.



Press UP or DOWN to get this information in the following sequence:



- a. Date of the last ION calibration (month, day and year)
- b. Time when the last ION calibration was completed (hour and minutes)
- c. Offset calibration value expressed in mV and displayed on the primary LCD with the value used to calibrate the offset on the secondary LCD.
- d. Slope calibration value expressed in mV/[log (0.0001xppm)] and displayed on the primary LCD with the 2<sup>nd</sup> value used to calibrate the slope on the secondary LCD.



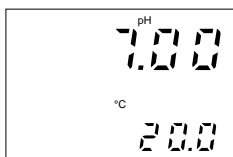
**TAKING TEMPERATURE MEASUREMENTS**

Taking a temperature measurement is very easy.

Connect the temperature probe to the instrument and turn the instrument ON.

Dip the liquid/general purpose temperature probe HI7669/2W into the sample

Allow the reading on the secondary display to stabilize (1 or 2 minutes).

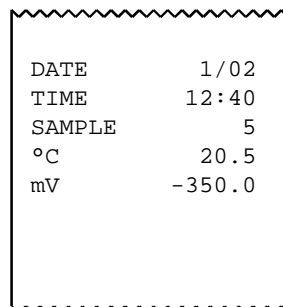
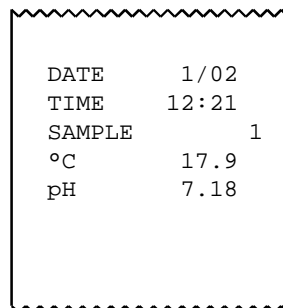


**PRINTING FUNCTION (for pH 302 only)**

Press PRINT to get a printout at any time.

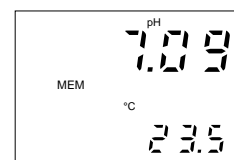


All the printouts will be complete with date, time, sample No., temperature and measurement value (pH or mV depending on the selected measurement range).



**HOLD FUNCTION (for pH 300 only)**

To hold and memorize the measured value, press MS. The last reading will be frozen on the display until the key is released. At the same time, this reading is stored in the memory. During this operation, the "MEM" indicator is lit.



To recall the stored memory value, press MR and the memorized reading will be displayed with the MEM indicator lit.



**RESET BUTTON**

The RESET button (see page 11) is used when the instrument displays erroneous messages due to strong electrical interference or when the instrument's power supply was disconnected before the meter was switched off.

It is necessary to press the reset button and restart the entire operation.

Calibration points should remain memorized. It is recommended to verify calibration before proceeding.

**pH CALIBRATION**

For greatest accuracy, it is recommended that the instrument is calibrated frequently.

For a faster operation, it is possible to standardize the electrode at a value close to the expected sample value or at pH 7.01 only (one point calibration), but it is always good practice to calibrate at least 2 points.

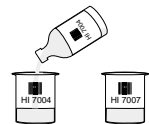
**For pH 301 only:**

Due to electrode conditioning time the electrode must be kept immersed for a few seconds to stabilize. The meters are equipped with a stability indicator and the user will be guided step by step with easy indications on the display during the pH calibration. This will make the calibration a simple and error-free procedure.

The standard calibration program of the meter is prepared for 3 (maximum) buffers. The selectable pH values are: 1.68, 4.01, 6.86, 7.01, 9.18, 10.01.

**INITIAL PREPARATION**

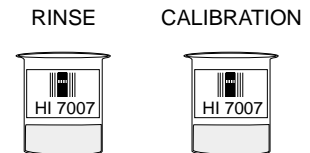
Pour small quantities of pH7.01 (**HI7007/HI8007**) and pH4.01 (**HI7004/HI8004**) and/or pH10.01 (**HI7010/HI8010**)



solution into individual beakers. If possible, use plastic beakers to minimize any EMC interferences.

For accurate calibration use two beakers for each buffer solution, the first one for rinsing the electrode, the second one for calibration.

By doing this, contamination between the buffers is minimized.



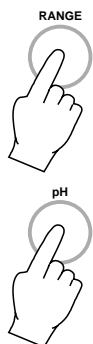
To get accurate readings, use pH 7.01 and



pH 4.01 if you are going to measure acid samples, or pH 7.01 and pH 10.01 for alkaline measurements or, for **pH301** only, perform a 3-point calibration for the entire range.

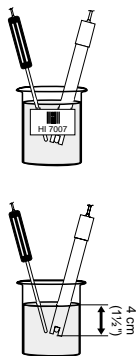
**PROCEDURE**

- Press RANGE (for **pH300** and **pH302**) to select the pH measurement mode.
- Press pH (for **pH301**) to select the pH measurement mode.
- Remove the protective cap from the pH electrode.



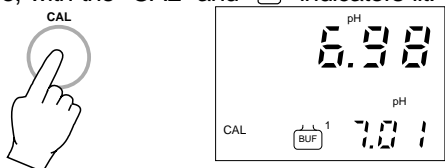
**ONE POINT CALIBRATION (OFFSET)**

- Immerse the pH electrode into the selected buffer (e.g. pH 7.01) buffer solution and shake briefly.



**Note:** the electrode should be submerged approximately 4 cm (1½") into the solution. The temperature probe should be located as close as possible to the pH electrode.

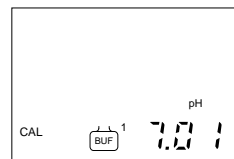
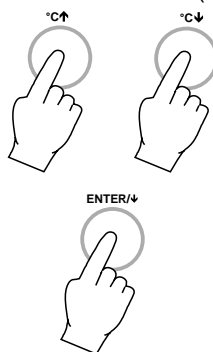
- Press CAL. The primary LCD will display the pH value using the current offset and slope, with the "CAL" and "BUF" indicators lit.



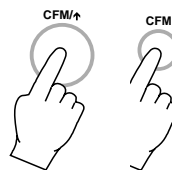
For **pH 302** only: the printer will also print step by step instructions for the calibration procedure.

Dip the electrode in the pH 7 solution; wait 30 sec and then press CFM

- Select the buffer value by pressing UP or DOWN or just DOWN (for **pH 302**) until the secondary LCD displays the value of the first solution (e.g. "7.01").

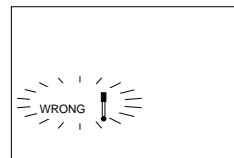


- Only when the reading is stable (less than ±0.03 variation in a 10 seconds time interval) the "BUF" indicator will stop flashing (after about 30 seconds) and the "CFM" indicator will start blinking.



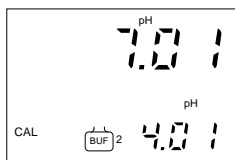
- Press CFM to confirm the calibration.

If the reading is not close to the selected buffer, "WRONG" and "WRONG" will blink alternately. If the reading is close to the selected buffer (±1 pH), the meter stores the reading



(and adjusts the offset point).

The buffer value is then displayed on the primary LCD and the secondary LCD will display the expected second buffer value.



For **pH 302** only: the printer will print further instructions for the calibration procedure.

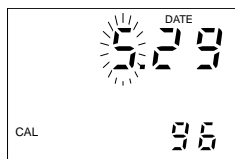
Now dip the electrode in 2nd solution, wait 30 sec and then press CFM

- Press CAL and the calibration process is ended with just the offset of the meter calibrated. For best accuracy however, it is recommended that a two-point calibration is performed.

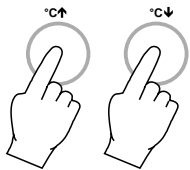


**For pH 300 only:**

The calibration process is complete and the display will ask for the date entry.



Use UP or DOWN to select the month, the day and the year.



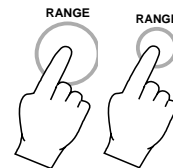
Use CAL to toggle between month, day and year.



After entering the calibration date, press CFM and the meter will return to the normal operating mode.



**Note:** during calibration, the secondary LCD displays the selected buffer value. By pressing RANGE the temperature value can be also displayed. This will allow you to check the buffer temperature during calibration.



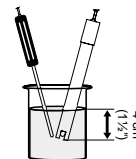
**TWO-POINT CALIBRATION**

A two-point calibration is recommended for best accuracy. As a first point use pH 7.01 (or pH 6.86 can also be used for **pH 301**). As a second point use pH 4.01 (or pH 1.68 for **pH 301** only) if you are going to measure acid samples (pH 7 or less), use pH 10.01 (or pH 9.18 for **pH 301** only) if you are going to measure alkaline samples.

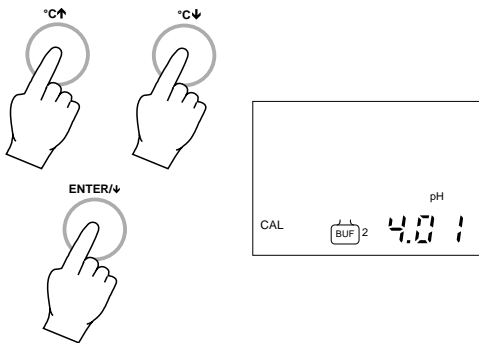
- Proceed as described above for one point calibration but do not quit calibration by pressing CAL at the end.
- After the first calibration point is confirmed, immerse the pH electrode into the second buffer solution (pH 4.01 or pH 10.01; for **pH 301** only, the second buffer can also be pH 1.68 or pH 9.18) and shake briefly.



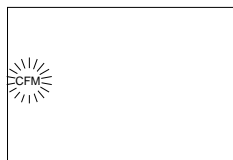
**Note:** the electrode should be submerged approximately 4 cm (1½") into the solution. The temperature probe should be located as close as possible to the pH electrode.



- Press UP or DOWN or just DOWN (for pH 302) until the secondary display changes the value of the second solution (e.g. "4.01").

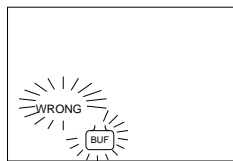
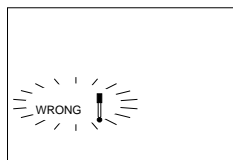
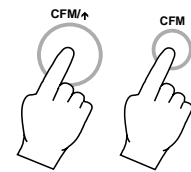


- Only when the reading is stable (less than  $\pm 0.03$  variation in a 10 seconds time interval), the "BUF" indicator will stop flashing (after about 30 seconds) and the "CFM" indicator will blink.



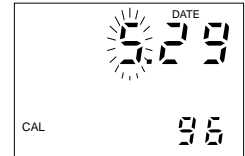
- Press CFM to confirm the calibration.

If the reading is not within 70% to 108% of the buffer solution, "WRONG  $\frac{BUF}{2}$ " and "WRONG !" will blink alternately. If the reading is close to the selected buffer (between 70 to 108%), the meter stores the reading (and adjusts the slope point).

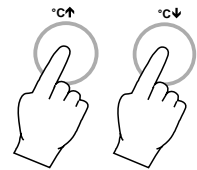


**For pH 300 only:**

The calibration process is complete and the display will ask for the date entry.



Use UP or DOWN to select the month, the day and the year.



Use CAL to toggle between month, day and year.

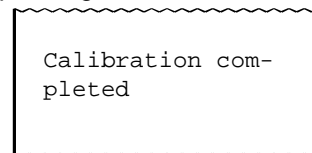


After entering the calibration date, press CFM and the meter will return to the normal operating mode.



**For pH 302 only:**

The calibration process is complete. The meter will print a confirm message and return to the normal operating mode.



**For pH 301:**

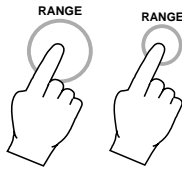
The second buffer value is then displayed on the primary LCD and the secondary LCD will display the expected third buffer value.

- Press CAL and the calibration process is ended with the offset and the 1<sup>st</sup> slope of the meter calibrated.



**Note:** the meter will automatically skip the buffer that was used for the first calibration to avoid erroneous calibration.

**Note:** during calibration, the secondary LCD displays the selected buffer value. By pressing RANGE the temperature value can be also displayed. This will allow you to check the buffer temperature during calibration.



**THREE-POINT CALIBRATION (for pH301 only)**

A three-point calibration (for the entire pH range) can be performed with **pH301**. These are the selectable buffers:

| 1 <sup>st</sup> buffer (offset) | 2 <sup>nd</sup> /3 <sup>rd</sup> buffer (1 <sup>st</sup> slope) | 3 <sup>rd</sup> /2 <sup>nd</sup> buffer (2 <sup>nd</sup> slope): |
|---------------------------------|-----------------------------------------------------------------|------------------------------------------------------------------|
| pH 6.86 or 7.01                 | pH 1.68 or 4.01 or 9.18                                         | pH 9.18 or 10.01 or 4.01                                         |

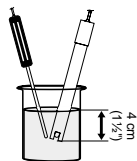
- Proceed as described for the two-point calibration but do not quit calibration by pressing CAL at the end.



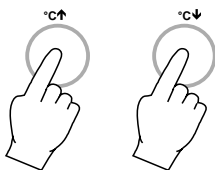
- After the second calibration point is confirmed, immerse the pH electrode into the third buffer solution (e.g. pH 10.01) and shake briefly.



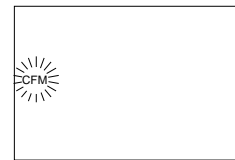
**Note:** the electrode should be submerged approximately 4 cm (1½") into the solution. The temperature probe should be located as close as possible to the pH electrode.



- Select the 3<sup>rd</sup> buffer value on the secondary display by pressing UP or DOWN (e.g. "10.01").

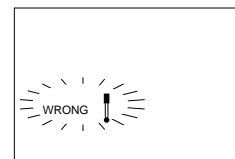


- Only when the reading is stable (less than ±0.03 variation in a 10 seconds time interval), the "BUF" indicator will stop flashing (after about 30 seconds) and the "CFM" indicator will blink.



- Press CFM to confirm the calibration.

If the reading is not within 70% to 108% of the buffer solution, "WRONG" and "BUF" will blink alternately. If the reading is close to the selected buffer (between 70 and 108%), the meter stores the reading (and adjusts the 2<sup>nd</sup> slope point).



- The calibration process is ended with the offset and the 1<sup>st</sup> and 2<sup>nd</sup> slope of the meter calibrated.

**Note:** the meter will automatically skip the buffer that was used for the first and second calibration to avoid erroneous calibration.

**Note:** during calibration, the secondary LCD displays the selected buffer value. By pressing RANGE the temperature value can be also displayed. This will allow you to check the buffer temperature during calibration.



**CALIBRATION WITH MANUAL TEMPERATURE COMPENSATION**

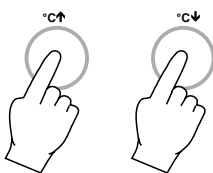
If for some reason the temperature probe is defective, or it is required to calibrate with manual temperature compensation, follow the procedure below:

- Unplug the temperature probe from the meter.
- Note the temperature of the buffer solutions with a **ChecktempC** or a glass thermometer with a resolution of 0.1°C.



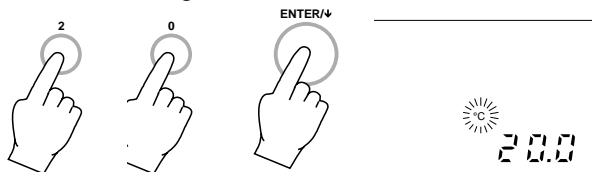
• **For pH300 and pH301 only**

Use UP or DOWN to manually adjust the display reading to the value of the reference thermometer (e.g. 20°C). The value will be displayed on the secondary LCD and "°C" symbol will flash.



• **For pH302 only**

Press the +/- key (for eventual negative figures) followed by the noted temperature on the numeric keypad (e.g. 20°C) and ENTER. The value will be displayed on the secondary LCD and "°C" symbol will be flashing.



- Follow the calibration procedure as for pH calibration with temperature probe connected (see page 29).

**pH VALUES AT VARIOUS TEMPERATURE**

The calibration buffer solutions are effected by temperature changes to a lesser degree than normal solutions.

When manually entering the calibration values (see program #2 for **pH302**) refer to the following chart.

| TEMP |     | pH VALUES |      |      |      |      |       |
|------|-----|-----------|------|------|------|------|-------|
| °C   | °F  | 1.68      | 4.01 | 6.86 | 7.01 | 9.18 | 10.01 |
| 0    | 32  | 1.67      | 4.01 | 6.98 | 7.13 | 9.46 | 10.32 |
| 5    | 41  | 1.67      | 4.00 | 6.95 | 7.10 | 9.39 | 10.24 |
| 10   | 50  | 1.67      | 4.00 | 6.92 | 7.07 | 9.33 | 10.18 |
| 15   | 59  | 1.67      | 4.00 | 6.90 | 7.04 | 9.27 | 10.12 |
| 20   | 68  | 1.68      | 4.00 | 6.88 | 7.03 | 9.22 | 10.06 |
| 25   | 77  | 1.68      | 4.01 | 6.86 | 7.01 | 9.18 | 10.01 |
| 30   | 86  | 1.68      | 4.02 | 6.85 | 7.00 | 9.14 | 9.96  |
| 35   | 95  | 1.69      | 4.03 | 6.84 | 6.99 | 9.10 | 9.92  |
| 40   | 104 | 1.69      | 4.04 | 6.84 | 6.98 | 9.07 | 9.88  |
| 45   | 113 | 1.70      | 4.05 | 6.83 | 6.98 | 9.04 | 9.85  |
| 50   | 122 | 1.71      | 4.06 | 6.83 | 6.98 | 9.01 | 9.82  |
| 55   | 131 | 1.72      | 4.07 | 6.84 | 6.98 | 8.99 | 9.79  |
| 60   | 140 | 1.72      | 4.09 | 6.84 | 6.98 | 8.97 | 9.77  |
| 65   | 149 | 1.73      | 4.11 | 6.85 | 6.99 | 8.95 | 9.76  |
| 70   | 158 | 1.74      | 4.12 | 6.85 | 6.99 | 8.93 | 9.75  |

When using automatic calibration, the appropriate value will be displayed.

For instance, if the buffer temperature is at 25°C, the display will show "pH 4.01" or "7.01" or "10.01".

If the buffer temperature is at 20°C, the display will show "pH 4.00"/"7.03"/"10.06".

If the buffer temperature is at 50°C, the display will show pH "4.06"/"6.98"/"9.82".

## ION CALIBRATION (for pH301 only)

For greatest accuracy, it is recommended that the instrument is calibrated frequently.

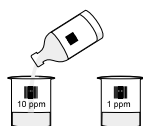
The standard calibration program of the meter, however, is prepared for 2 (maximum) buffers. The selectable ION values are:

ppm 0.1, 1, 10, 100, 1000.

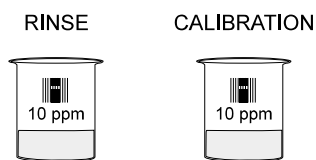
Due to electrode conditioning time the electrode must be kept immersed a few seconds to stabilize. The meters are equipped with a stability indicator and the user will be guided step by step with easy indications on the display during the ION calibration. This will make the calibration a simple and error-free procedure.

### INITIAL PREPARATION

Pour small quantities of the chosen ION calibration solution into individual beakers. If possible, use plastic beakers to minimize any EMC interferences.



For accurate calibration use two beakers for each solution, the first one for rinsing the electrode, the second one for calibration. By doing this, contamination between the buffers is minimized.



### PROCEDURE

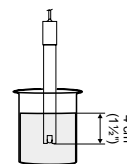
- Press ION to select the ION measurement mode.
- Remove the protective cap from the ISE electrode.



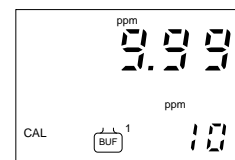
### ONE POINT CALIBRATION (OFFSET)

- Immerse the ISE electrode into the selected buffer (e.g. 10 ppm) solution and shake briefly.

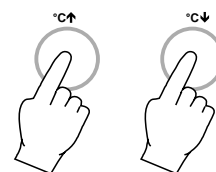
**Note:** the electrode should be submerged approximately 4 cm (1½") into the solution.



- Press CAL. The primary LCD will display the ION value using the current offset and slope, with the "CAL" and "BUF 1" indicators.



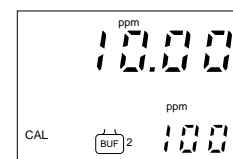
- Select the buffer value by pressing UP or DOWN until the secondary LCD displays the value of the first solution (e.g. "10").



- Only when the reading is stable, will the "BUF 1" indicator stop flashing (after about 30 seconds) and the "CFM" the indicator start blinking.



- Press CFM to confirm the calibration. The meter stores the reading (and adjusts the offset point). The calibration solution value is then displayed on the primary LCD and the secondary LCD will display the expected 2<sup>nd</sup> calibration value.



- Press CAL and the calibration process is ended with only the offset of the meter calibrated. For best accuracy however, it is recommended that a two-point calibration is performed.



**Note:** during calibration, the secondary LCD displays the selected buffer value. By pressing RANGE the temperature value can be also displayed. This will allow you to check the buffer temperature during calibration.

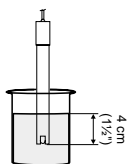


### TWO-POINT CALIBRATION

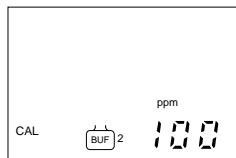
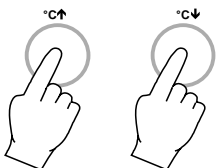
A two-point calibration is recommended for best accuracy.

- Proceed as described above for one point calibration but do not quit calibration by pressing CAL at the end.
- After the first calibration point is confirmed, immerse the ISE electrode into the second calibration solution (e.g. 100 ppm) and shake briefly.

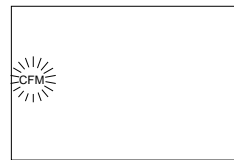
**Note:** the electrode should be submerged approximately 4 cm (1½") into the solution.



- Press UP or DOWN until the secondary display changes the value of the second solution (e.g. "100").



- Only when the reading is stable, the "BUF" indicator will stop flashing (after about 30 seconds) and the "CFM" indicator will blink. The meter will check for the slope reading.



- Press CFM to confirm the calibration. The meter stores the reading (and adjusts the slope point).



The ION calibration process is complete and the meter will return to the normal operating mode.

**Note:** the meter will automatically skip the buffer that was used for the first calibration to avoid erroneous calibration.

**Note:** during calibration, the secondary LCD displays the selected calibration value. By pressing RANGE the temperature value can be also displayed. This will allow you to check the solution temperature during calibration.



## mV CALIBRATION

The meter has been factory calibrated for the mV and is ready for measurements. The calibration data are stored in the EEPROM.

The ORP electrodes are interchangeable and no mV calibration is needed when the ORP electrode is replaced.

If, for any reason, the mV measurements are out of accuracy, re-calibration should be carried out as follows.

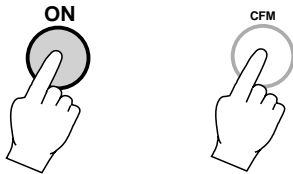
### **INITIAL PREPARATION**

Prepare a simulator with an accuracy of  $\pm 0.1$  mV that can provide:

- $\pm 390.0$  mV and  $\pm 1000.0$  mV for **pH300**
- $0.0$  mV,  $\pm 500.0$  mV and  $\pm 1500.0$  mV for **pH301** and **pH302**.

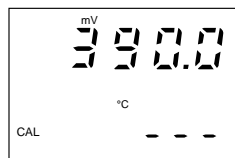
### **PROCEDURE FOR pH 300**

- Connect the meter to the simulator through the connection cable (connect it to the BNC electrode socket).
- Turn the **pH 300** on by pressing ON plus CFM simultaneously.



**Note:** this calibration can also be performed immediately after the temperature calibration (see page 50).

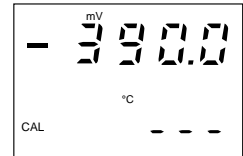
- The primary LCD will display "390.0 mV".



- Set the simulator to "390.0 mV".  
Wait for 5 seconds and press CFM to confirm the value.



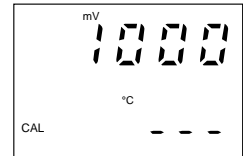
- The primary LCD will display "-390.0 mV".



- Set the simulator to "-390.0 mV".  
Wait for 5 seconds and press CFM to confirm the value.



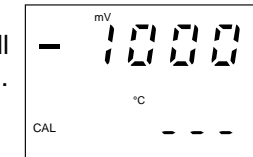
- The primary LCD will display "1000 mV".



- Set the simulator to "1000.0 mV".  
Wait for 5 seconds and press CFM to confirm the value.



- The primary LCD will display "-1000 mV".



- Set the simulator to "-1000.0 mV".  
Wait for 5 seconds and press CFM to confirm the value.

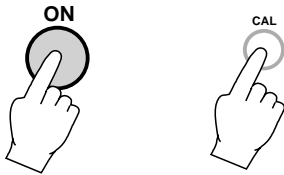


The mV calibration process is complete and the meter will return to the normal operating mode.

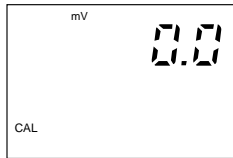


**PROCEDURE FOR pH 301**

- Connect the meter to the simulator through the connection cable (connect it to the BNC electrode socket).
- Turn the **pH301** on by pressing ON plus CAL simultaneously.



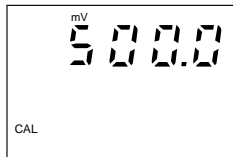
- The primary LCD will display "0.0 mV".
- Set the simulator to "0.0 mV".



- As soon as the reading is stable (after about 10 seconds), the "CFM" indicator will start blinking. Press CFM to confirm the value.



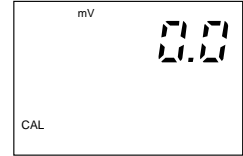
- The primary LCD will display "500.0 mV".
- Set the simulator to "500.0 mV".



- As soon as the reading is stable (after about 10 seconds), the "CFM" indicator will start blinking. Press CFM to confirm the value.



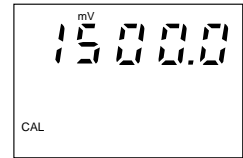
- The primary LCD will display "0.0 mV".
- Set the simulator to "0.0 mV".



- As soon as the reading is stable (after about 10 seconds), the "CFM" indicator will start blinking. Press CFM to confirm the value.



- The primary LCD will display "1500.0 mV".
- Set the simulator to "1500.0 mV".



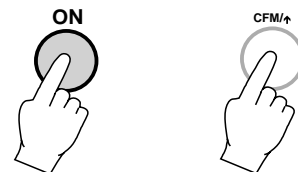
- As soon as the reading is stable (after about 10 seconds), the "CFM" indicator will start blinking. Press CFM to confirm the value.



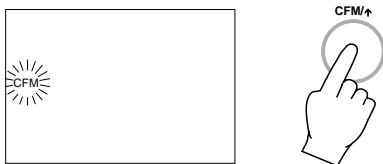
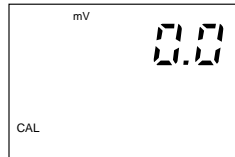
The mV calibration process is complete and the meter will return to the normal operating mode.

**PROCEDURE FOR pH 302**

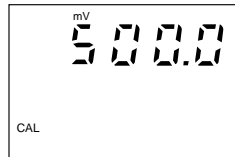
- Connect the meter to the simulator through the connection cable (connect it to the BNC electrode socket).
- Turn the **pH302** on by pressing ON plus CFM simultaneously.



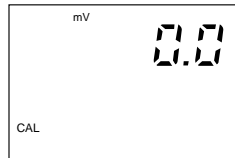
- The primary LCD will display "0.0 mV",
- Set the simulator to "0.0 mV".
- As soon as the reading is stable (after about 10 seconds), the "CFM" indicator will start blinking. Press CFM to confirm the value.



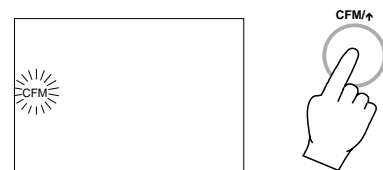
- The primary LCD will display "500.0 mV".
- Set the simulator to "500.0 mV".
- As soon as the reading is stable (after about 10 seconds), the "CFM" indicator will start blinking. Press CFM to confirm the value.



- The primary LCD will display "0.0 mV".
- Set the simulator to "0.0 mV".
- As soon as the reading is stable (after about 10 seconds), the "CFM" indicator will start blinking. Press CFM to confirm the value.



- The primary LCD will display "1500.0 mV".
- Set the simulator to "1500.0 mV".
- As soon as the reading is stable (after about 10 seconds), the "CFM" indicator will start blinking. Press CFM to confirm the value.



The mV calibration process is complete and the meter will return to the normal operating mode.

## TEMPERATURE CALIBRATION (for Technical Personnel only)

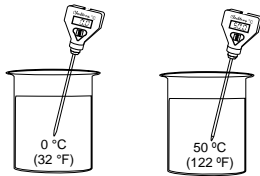
The pH meter has been factory calibrated for the temperature and is ready for measurements.

The temperature probes are interchangeable and no temperature calibration is needed when the temperature probe is replaced.

If, for any reason, the temperature measurements are inaccurate, re-calibration should be carried out as follows.

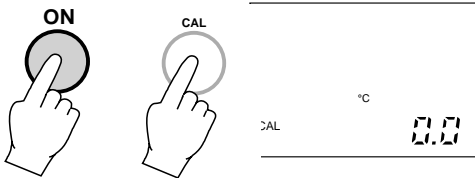
### ***INITIAL PREPARATION***

- Prepare a vessel containing ice (at 0.0°C/32°F) and water and another one containing hot water (at a temperature of 50.0°C/122°F). Place insulation material around the container to minimize temperature changes.
- Use a **ChecktempC** or a calibrated thermometer with a resolution of 0.1 °C as a reference thermometer.



### ***PROCEDURE FOR pH 300***

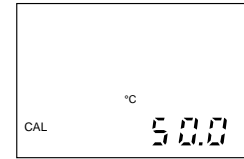
- Switch the **pH 300** on while pressing CAL. The "CAL" indicator will be lit. The secondary LCD section will show "0.0°C".



- Immerse the temperature probe in the vessel with the ice and water.



- Wait for about 30 seconds. Press CFM. The secondary LCD section will show "50.0°C".



- Immerse the temperature probe in the vessel with hot water.



- Wait for about 30 seconds. Press CFM.



- Complete your temperature calibration by pressing CAL if you do not want to perform the mV calibration (see page 44).



### ***PROCEDURE FOR pH 301***

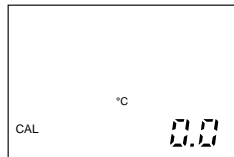
- Switch the **pH301** on while pressing CFM. The "CAL" indicator will be lit. The secondary LCD section will show "0.0°C".



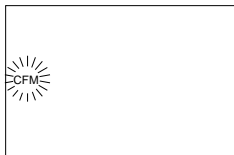
- Immerse the temperature probe in the vessel with the ice and water and wait for a few minutes.



- The secondary LCD will display "0.0 °C" with the "CAL" indicator.



- As soon as the reading is stable the "CFM" indicator will start blinking.



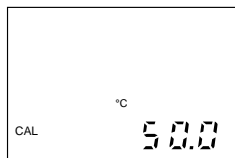
- Press the CFM key to confirm the calibration.



- Immerse the temperature probe in the vessel with hot water and wait for a few minutes.



- The secondary LCD will display "50.0 °C" with the "CAL" indicator.



- As soon as the reading is stable the "CFM" indicator will start blinking.



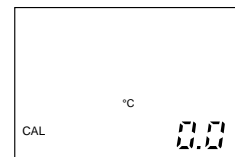
- Press CFM to confirm the calibration.



- The temperature calibration is complete and the meter will return to the normal operating mode.

### ***PROCEDURE FOR pH 302***

- Switch the **pH302** on while pressing CAL. The "CAL" indicator will be lit. The secondary LCD section will show "0.0 °C".



- Immerse the temperature probe in the vessel with the ice and water and wait for a few minutes.



- As soon as the reading is stable the "CFM" indicator will start blinking.



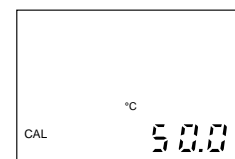
- Press CFM to confirm the calibration.



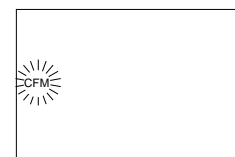
- Immerse the temperature probe in the vessel with hot water and wait for a few minutes.



- The secondary LCD will display "50.0 °C" with the "CAL" indicator.



- As soon as the reading is stable the "CFM" indicator will start blinking.



- Press CFM to confirm the calibration.



- The temperature calibration is complete and the meter will return to the normal operating mode.

## LOGGING WITH pH 301

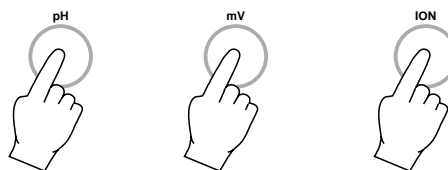
This function permits the automatic logging of pH or mV or ION measurements together with the temperature without needing an operator and for a long period of time.

The lot number goes from 1 to 99 and then back to #1.

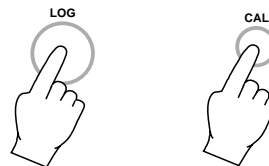
The maximum capacity per lot is 8000 samples.

Set the appropriate logging interval (see page 14) selectable between 1, 15, 30 seconds or 1, 5, 30, 60, 120, 180 minutes.

Select the appropriate measurement mode by pressing the pH or mV or ION key.

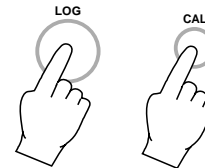


Press LOG and then CAL to enter the logging mode.



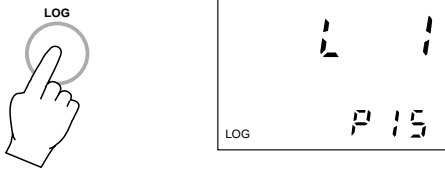
Once in the logging mode, the interval cannot be changed.

Exit the logging mode first (by pressing LOG and then CAL) before setting a new interval.

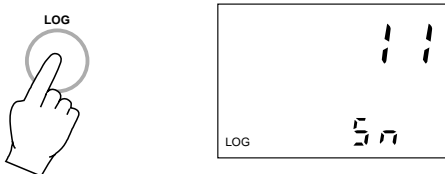


During logging, you can check some information about the logged data.

Press LOG and the primary LCD will show the current lot number and the secondary LCD will display the current page number.

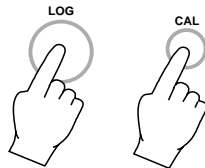


Press LOG again to display the current sample number (the number of values that have been taken in the current lot).

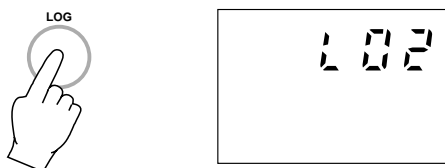


**TO STOP LOGGING**

To stop logging press LOG and then CAL.



Press LOG to display the next lot number.



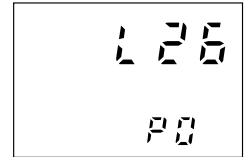
**Note:** if OFF is pressed while logging, the meter will stop the logging and then turn off.



**MEMORY ORGANIZATION**

The memory used for storing the logged data is divided into 16 pages. The capacity of each page is 500 samples. It starts to log from page 16 downwards until 1 and then 16 again, overwriting the previous data. However,

when this happens the LCD will show page "0", indicating the overwriting has happened.

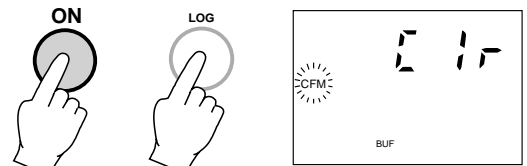


Each time a new logging period starts, it automatically starts a new page.

When the samples collected for a single lot are more than the limit (8000 samples) the meter will automatically stop logging.

**TO CLEAR LOGGED DATA**

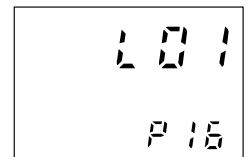
The entire logged data can be cleared by pressing LOG as soon as the meter is turned on (i.e. by pressing ON and LOG simultaneously).



The choice has to be confirmed by pressing CFM.






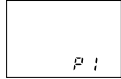
The next logging will start from page 16.



## PROGRAMMING FUNCTIONS WITH pH302

There are 9 programs all together in the instrument. To select a particular program, press PGM followed by the program number on the numeric keyboard.





E.g. To select program 1

- press PGM  
- press 1  

By pressing PGM the secondary LCD will show "P" to confirm the programming mode.

By pressing 1, the secondary LCD will show "P1" to confirm the selected program.

At this stage, the secondary LCD shows "Px - y", where x refers to the program number you pressed and y refers to 1 ENTER or 2 ENTER, i.e.:

- choice #1 selected by pressing 1 followed by ENTER  
- or
- choice #2 selected by pressing 2 followed by ENTER.  

Whenever a numeric value is entered, the entry appears on the primary display.

There will be a long beep after either 1 + ENTER or 2 + ENTER is pressed, when the entered value is either wrong or not acceptable by the particular program.

The 9 programs stored in the instrument are:

**Program #0**

To end the program function.

**Program #1**

To set the sample number, the time and the date (see page 60).

**Program #2**

To calibrate the meter using a nonstandard calibration buffer value (see page 64).

**Program #3**

To print the pH calibration data complete with date, time, pH offset and slope (see page 66).

**Program #4**

To log and print the pH/mV/temperature values at the selected interval from the start to the finishing time. The printout interval can be selected from 1 minute to 24 hours. This program can be stopped by selecting any other PGM function (see page 67).

**Program #5**

To log and print the pH/mV/temperature values at a user-selectable interval from a given time up to a selectable pH or mV value. When this pH/mV value is exceeded, the program stops by printing the endpoint hour and minute. The printout interval can be selected from 1 minute to 24 hours. This program can also be stopped by selecting any other PGM function (see page 71).

**Program #6**

To set the upper and the lower pH or mV alarm limits. A beeper will sound whenever the measured value exceeds the limit. This program can only be terminated by pressing PGM + 0 (see page 75).

### Program #7

To select a different printing language (6 languages are available) (see page 78).

### Program #8

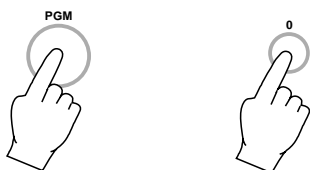
To print the ion concentration in M for the measured pH value (see page 79).

### Program #9

To set the baud rate and the STRINGII code of Escape character for the RS232 (see page 79).

To stop or exit any program:

- press PGM
- press 0



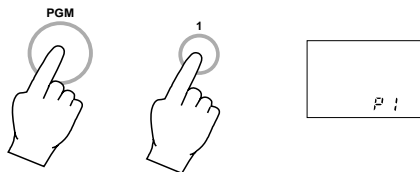
**Note:** the instrument must be in pH mode for program #2, #3 and #8. Otherwise a long beep will sound.

### **PROGRAM #1 (pH 302)**

This program allows you to set sample number, time and date.

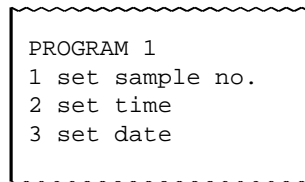
To enter program #1:

- Push the PGM key and then 1.

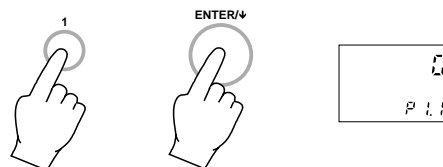


The printer will then define the three functions:

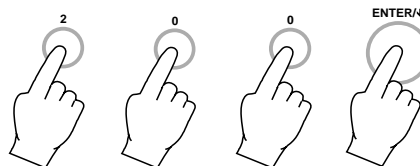
- 1 is the sample number,
- 2 is time,
- 3 is the date.



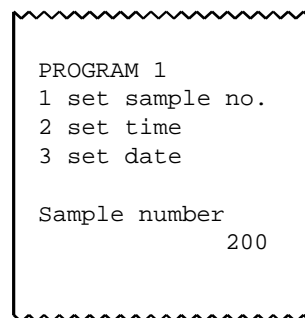
- To set the sample number (choice #1), press 1 followed by ENTER. "P1.1" will be displayed on the secondary LCD with "0" on the primary one.



Enter the desired number (choose any number from 1 to 999) followed by ENTER. E.g. sample number 200.

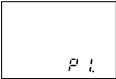


The printer will print the value.



Samples after 999 will be reset to zero and the sample number will automatically advance from 0 to 999 in increment of 1 each time the instrument logs and/or prints a reading.

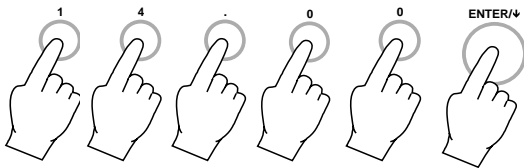


- "P1." will be displayed on the secondary LCD. 
- To set the time press 2 followed by ENTER. "P1.2" will be displayed on the secondary LCD with "0" on the primary one.

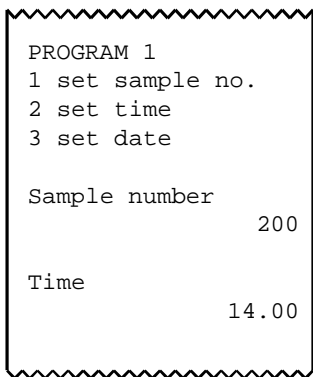


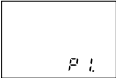
The time value (choice #2) can be set for a 24 hour clock. Enter the desired number also using the decimal point followed by ENTER.

E.g. 2 P.M. equals 14.00. Press "14.00" followed by ENTER.

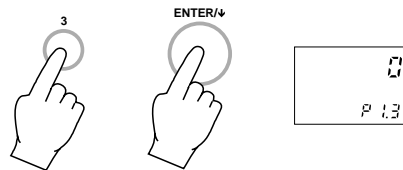


The printer will print the time.



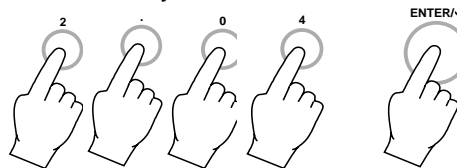
- "P1." will be displayed on the secondary LCD. 

- To set the date press 3 followed by ENTER. "P1.3" will be displayed on the secondary LCD with "0" on the primary one.

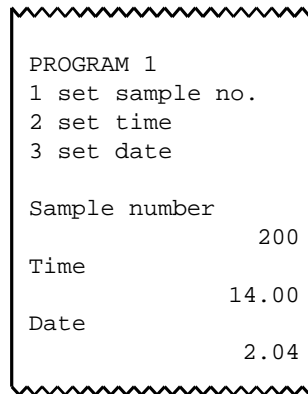


When setting the date (choice #3), enter the month first. Separate month and day by a decimal point.

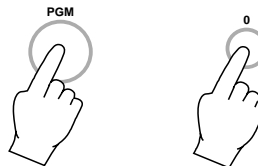
E.g. February 4th is entered as "2.04" followed by ENTER.



The printer will print the date.



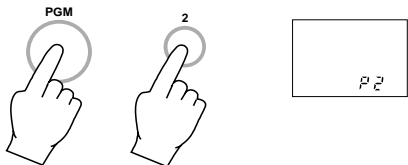
- Press PGM and then 0 to exit from the program mode.



**PROGRAM #2 (pH 302)**

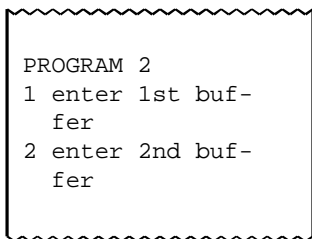
This program lets you calibrate with buffer values other than 4.01, 7.01 and 10.01 pH which are pre-programmed into memory.

- To enter program #2, press PGM and then 2.

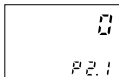


The printer will then define the two functions:

- 1 is the first buffer,
- 2 is the second buffer.



- The meter will default to the 1<sup>st</sup> buffer value entry displaying "P2.1" on the secondary LCD with "0" on the primary one.



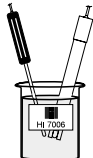
The buffers can be anywhere between 0 and 14 pH.

**Example:**

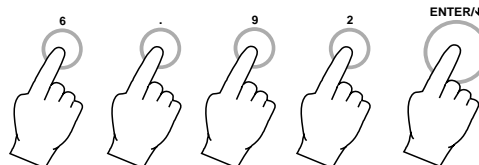
To calibrate with NBS buffers 6.86 pH and 9.18 pH at a temperature of 10°C.

The corresponding pH values at this temperature are 6.92 and 9.33 respectively.

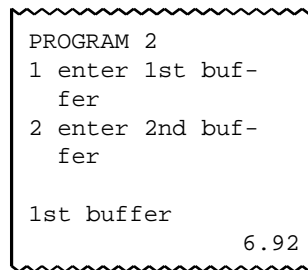
- Immerse the pH electrode and the temperature probe into the 1<sup>st</sup> buffer (e.g. pH 6.86).



- Check the appropriate value for the buffer at the measured buffer temperature (see page 39).
- After about 30 seconds enter the 1<sup>st</sup> buffer value at the working temperature followed by ENTER. E.g. 6.92 (at 10°C).



The printer will print the 1<sup>st</sup> buffer value.



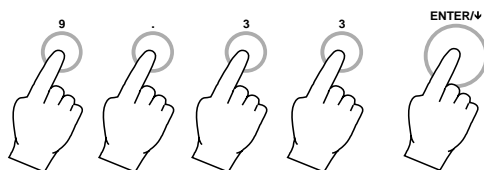
- The secondary display will show "P2.".
- To set the second buffer press 2 followed by ENTER. "P2.2" will be displayed on the secondary LCD with "0" on the primary one.



- Rinse the electrode and immerse it in the 2<sup>nd</sup> buffer (e.g. pH 9.18).
- Check the appropriate value for the buffer at the measured buffer temperature (see page 39).



- After about 30 seconds enter the 2<sup>nd</sup> buffer value at the working temperature and then press ENTER. E.g. 9.33 (at 10°C).



The printer will print the 2<sup>nd</sup> buffer value.

```
PROGRAM 2
1 enter 1st buf-
fer
2 enter 2nd buf-
fer

1st buffer           6.92

2nd buffer           9.33
```

- Press PGM to quit this program.
- The calibration is now complete.



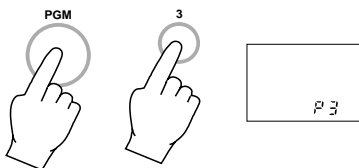
### **PROGRAM #3 (pH 302)**

This program prints the date, time, the offset and slope characteristics of the pH electrode.

**Note:** the offset and the slope characteristics of the electrode are referred to the last performed pH calibration.

No programming is required.

Simply press PGM and 3.



The printer will print the pH calibration data.

```
PROGRAM 3
DATE           2/04  MM/DD
TIME           14:04 HH:MM
OFFSET         mV 0.16 in mV
SLOPE          95.3% in %
```

The program function ends.

Changes in an electrode's performance can be determined from this information.

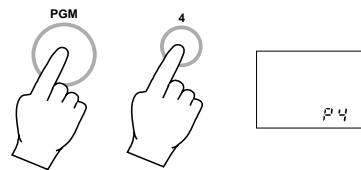
The offset pH value should be between  $\pm 30$  mV. For values between  $\pm 30$  and  $\pm 60$  mV change the reference electrolyte and repeat the calibration procedure. For values higher than +60 mV or lower than -60 mV the electrode is no longer reliable. See the electrode maintenance section on page 84.

The slope characteristic is in percentage of the theoretical value of 58.16 mV per pH unit at 20°C.

### **PROGRAM #4 (pH 302)**

This program logs and prints pH/mV and temperature values at a preset interval between 1 minute and 24 hours.

To enter the program press PGM and 4.



The printout defines functions 1, 2 and 3:

- 1** is a start time,
- 2** is the time interval,
- 3** is the finish time.

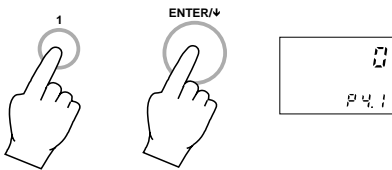
```

PROGRAM 4

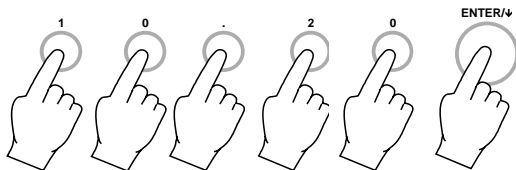
1 enter start
  time
2 enter time int-
  erval
3 enter end time

```

- To set the start time (choice #1), press 1 followed by ENTER. "P4.1" will be displayed on the secondary LCD with "0" on the primary one.



- Enter the desired number followed by ENTER. E.g. Starting time 10:20.



Hours and minutes must be separated by a decimal point.

The printer will print the value.

```

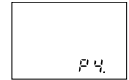
PROGRAM 4

1 enter start
  time
2 enter time int-
  erval
3 enter end time

start time
                                10:20

```

- "P4." will be displayed on the secondary LCD.



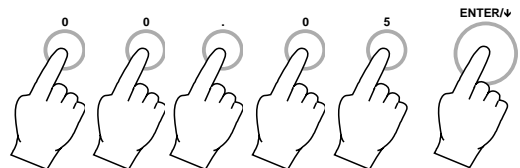
- To set the time interval (choice #2), press 2 followed by ENTER.

"P4.2" will be displayed on the secondary LCD with "0" on the primary one.



The minimum time interval is 1 minute. The interval is expressed in HH:MM.

E.g printing interval of 5 minutes.



The printer will print the value.

```

PROGRAM 4

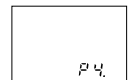
1 enter start
  time
2 enter time int-
  erval
3 enter end time

start time
                                10:20

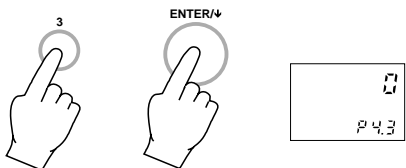
time interval
                                00:05

```

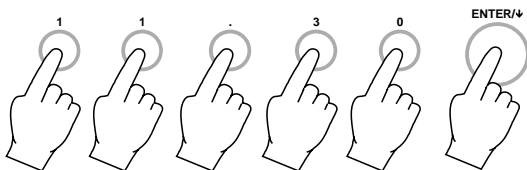
- "P4." will be displayed on the secondary LCD.



- To set the finishing time (choice #3), press 3 followed by ENTER.
- "P4.3" will be displayed on the secondary LCD with "0" on the primary one.



- Enter the desired number followed by ENTER. E.g. Finishing time 11:30. Hours and minutes must be separated by a decimal point.



The printer will print the value.

```

PROGRAM 4

1 enter start
  time
2 enter time int-
  erval
3 enter end time

start time
                                10:20

time interval
                                00:05

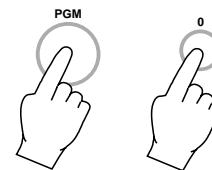
finishing time
                                11:30
  
```

|        |       |
|--------|-------|
| DATE   | 2/04  |
| TIME   | 10.20 |
| SAMPLE | 202   |
| °C     | 20.3  |
| pH     | 6.38  |
| DATE   | 2/04  |
| TIME   | 10.25 |
| SAMPLE | 203   |
| °C     | 20.4  |
| pH     | 6.39  |
| DATE   | 2/04  |
| TIME   | 10.30 |
| SAMPLE | 204   |
| °C     | 20.3  |
| pH     | 6.38  |

The "LOG" indicator is displayed when the meter starts to log.



When the instrument is in this mode and you want to stop before the end time, press PGM plus 0.

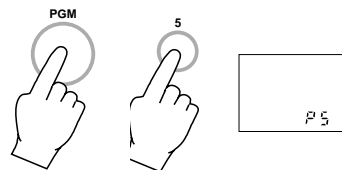


### **PROGRAM #5 (pH 302)**

This is the same as program #4 except that function "3" allows you to select an interrupt value for pH/mV instead of end time.

When this interrupt value is exceeded, the program prints the hour and minute of the endpoint.

To enter the program press PGM plus 5.



The printout defines functions 1, 2 and 3:

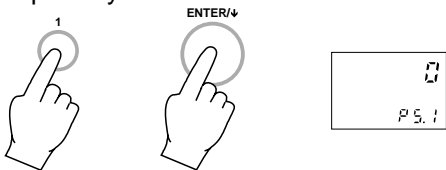
**1** is a start time,

**2** is the time interval,

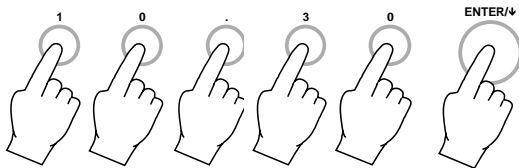
**3** is the interrupt value of pH/mV.

```
PROGRAM 5
1 enter start
  time
2 enter time in-
  terval
3 enter end
  pH/mV value
```

- To set the start time (choice #1), press 1 followed by ENTER. "P5.1" will be displayed on the secondary LCD with "0" on the primary one.



- Enter the desired number followed by ENTER. E.g. Starting time 10:30. Hours and minutes must be separated by a decimal point.



The printer will print the value.

```
PROGRAM 5
1 enter start
  time
2 enter time in-
  terval
3 enter end
  pH/mV value
Start time
10.30
```

- "P5." will be displayed on the secondary LCD.

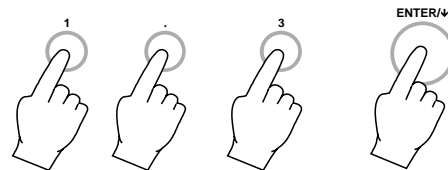


- To set the time interval (choice #2), press 2 followed by ENTER.

"P5.2" will be displayed on the secondary LCD with "0" on the primary one.



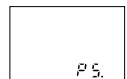
The minimum time interval is 1 minute. The interval is expressed in HH:MM. E.g printing interval of 1 hour and 30 minutes.



The printer will print the value.

```
PROGRAM 5
1 enter start
  time
2 enter time in-
  terval
3 enter end
  pH/mV value
Start time
10.30
Time Interval
1.30
```

- "P5." will be displayed on the secondary LCD.

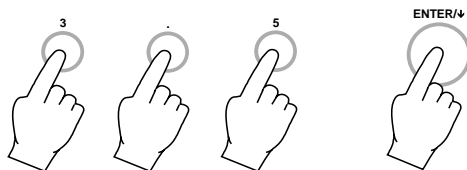


- To set the end pH/mV value (choice #3), press 3 followed by ENTER. "P5.3" will be displayed on the secondary LCD with "0" on the primary one.



- Enter the desired number followed by ENTER. E.g. pH 3.50 (supposed that the meter is in pH mode).

**Note:** the value will automatically be pH or mV depending on the selected measurement range.



The printer will print the value.

```

PROGRAM 5

1 enter start
  time
2 enter time in-
  terval
3 enter end
  pH/mV value

Start time          10.30

Time Interval      1.30

End point          3.50
  
```

```

DATE          2/04
TIME          10.30
SAMPLE        210
°C            20.3
pH            4.50

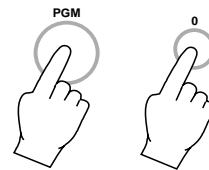
DATE          2/04
TIME          12.00
SAMPLE        211
°C            20.4
pH            4.01

DATE          2/04
TIME          12.25
SAMPLE        212
°C            20.3
pH            3.50
  
```

The "LOG" indicator is displayed when the meter starts to log.



When the instrument is in this mode and it is desired to stop before the end time, press PGM plus 0.

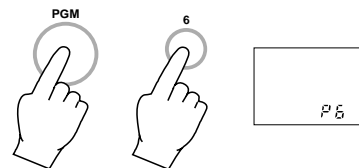


**PROGRAM #6 (pH 302)**

This program allows you to set upper and lower limits for pH/mV values.

A beeper will sound whenever the measured value exceeds the limit.

To enter the program press PGM plus 6.



The printout defines functions 1, 2 and 3:

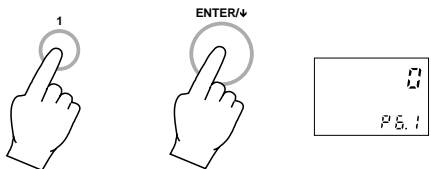
- 1 is the lower limit,
- 2 is the upper limit,
- 3 clears the alarm.

```

PROGRAM 6
1 set lower limit
2 set upper limit
3 clear alarm

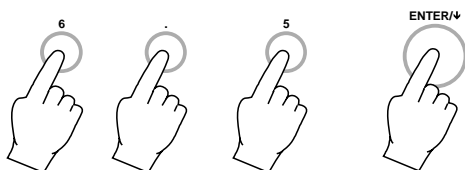
```

- To set the lower limit (choice #1), press 1 followed by ENTER. "P6.1" will be displayed on the secondary LCD with "0" on the primary one.



- Enter the desired number followed by ENTER. E.g. lower limit pH 6.50 (supposed that the meter is in pH mode).

**Note:** the value will automatically be pH or mV depending on the selected measurement range.



The printer will print the value.

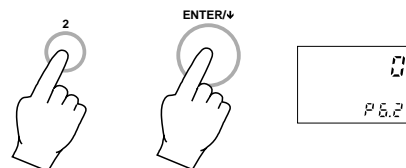
```

PROGRAM 6
1 set lower limit
2 set upper limit
3 clear alarm

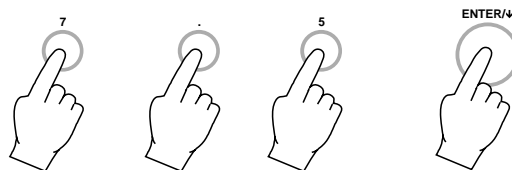
lower limit          6.50

```

- "P6." will be displayed on the secondary LCD.
- To set the upper limit (choice #2), press 2 followed by ENTER. "P6.2" will be displayed on the secondary LCD with "0" on the primary one.



- Enter the desired number followed by ENTER. E.g. upper limit pH 7.50.



The printer will print the value.

```

PROGRAM 6
1 set lower limit
2 set upper limit
3 clear alarm

lower limit          6.50
upper limit          7.50

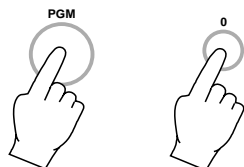
```

To stop the beeper from sounding when the limit is exceeded, press 3.





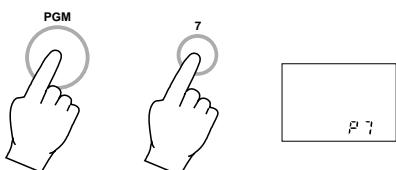
To definitely exit the program press PGM plus 0.



### **PROGRAM #7 (pH 302)**

This program allows the user to select a different working language.

Press PGM and then 7.



The printer will print out a list of languages available.

```
PROGRAM 7
1. English
2. Deutsch
3. Français
4. Español
5. Italiano
6. Svenska
```

The default working language is English.

To choose a language, key in the corresponding number then press ENTER.

E.g. To select French press 3 and ENTER.



Press PRINT and the printout will be in French.

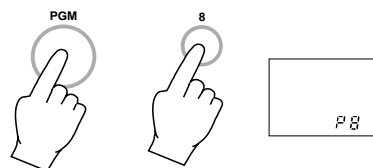


```
DATE (M/J) 2/04
HEURE 10.20
ECHANTILLON 215
°C 20.0
pH 6.52
```

### **PROGRAM #8 (pH 302)**

This program prints out the ion concentration in M for the pH value measured.

To activate the program, press PGM and then 8.



```
PROGRAM 8
3.88 pH--
0.132mM H+
```

**Note:** Make sure the meter is in pH mode, otherwise a long beep will be heard.

### **PROGRAM #9 (pH 302)**

This program is to set the baud rate and the STRINGII code of Escape character.

To enter the program press PGM plus 9.

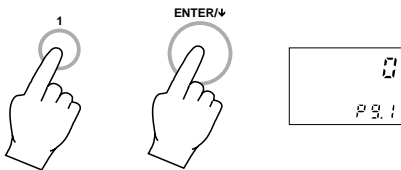


The printout defines functions 1 and 2:

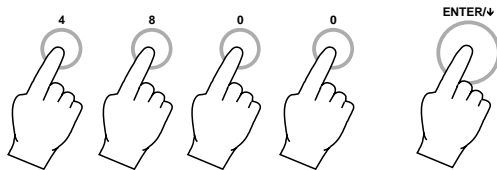
- 1 is the baud rate,
- 2 to set the STRINGII code of Escape character

```
PROGRAM 9
1 enter baud rate
2 enter STRINGII code
of escape
character
```

- To set the baud rate (choice #1), press 1 followed by ENTER. "P9.1" will be displayed on the secondary LCD with "0" on the primary one.



- Enter the desired number followed by ENTER. E.g. 4800 as baud rate.

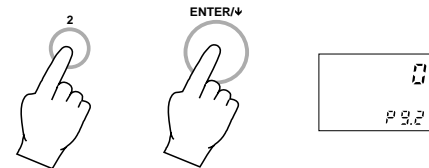


The printer will print the value.

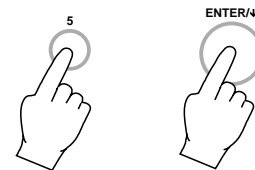
```
PROGRAM 9
1 enter baud rate
2 enter STRINGII code
of escape
character

baud rate                4800
```

- "P9." will be displayed on the secondary LCD.
- To set the command prefix (choice #2), press 2 followed by ENTER. "P9.2" will be displayed on the secondary LCD with "0" on the primary one.



- Enter the desired number followed by ENTER. E.g. STRINGII code 25.



The printer will print the value.

```
PROGRAM 9
1 enter baud rate
2 enter STRINGII code
of escape
character

baud rate                4800

STRINGII code           25
```

Press PGM to quit this program.



## INTERFACE WITH PC

Data transmission from the instrument to the PC is now much easier with the new **HI 92000** Windows® compatible application software offered by Hanna Instruments.

User friendly, **HI 92000** offers a variety of features and has an on-line help feature to support you throughout all situations.

**HI92000** allows you to use the powerful means of the most diffused spread sheet programs (e.g. Excel®, Lotus 1-2-3®). Simply run your favorite spread sheet and open the file downloaded by **HI 92000**. It is then possible to make any elaboration available with your software (e.g. graphics, statistical analysis).

To install **HI 92000** you need a 3.5" drive and a few minutes to follow the instructions conveniently printed on the disk label.

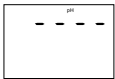

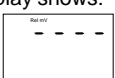
Contact your Hanna Dealer to request a copy.

To connect your pH meter to the PC use **HI 920010**, available through your Hanna Dealer. Make sure that your meter is switched off and plug the connectors, one into the meter RS232 connector, the other into the serial port of your PC.

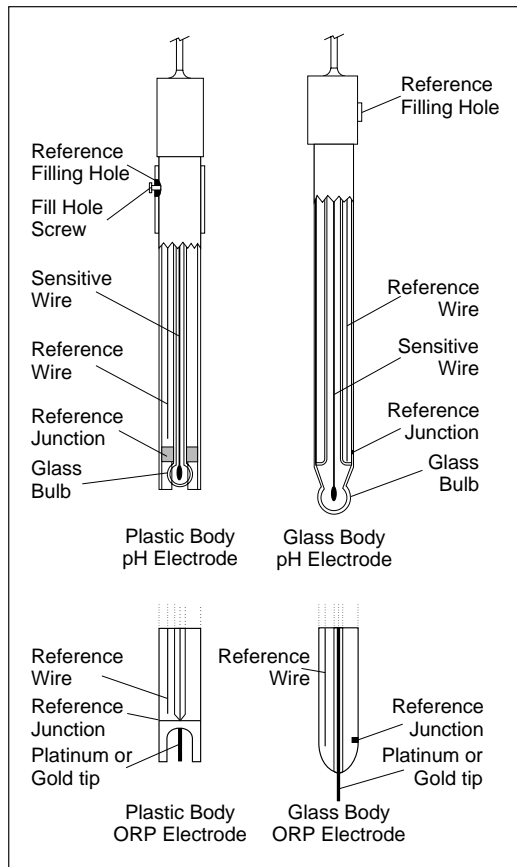
**Note:** Cables which are different from the **HI 920010** may use a different configuration. In which case any communication between the meter and the PC is not possible.

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 Lotus 1-2-3® Copyright of "Lotus Co."  
 Windows® and Windows Terminal® are registered Trademark of "Microsoft Co."

## TROUBLESHOOTING GUIDE

| Symptoms                                                                                               | Problem                                                               | Solution                                                                                                                                               |
|--------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| The meter does not work with the temperature probe                                                     | Defective ATC probe                                                   | Replace the probe                                                                                                                                      |
| The meter fails to calibrate or gives faulty readings                                                  | Defective pH electrode                                                | Replace the electrode                                                                                                                                  |
| The meter is slow in responding or gives faulty readouts                                               | The electrode is not working or the reference junction is clogged     | Leave the electrode in a storage solution after cleaning the junction. If problem persists, replace the electrode                                      |
| The meter does not accept the 2 <sup>nd</sup> buffer solution for calibration                          | Defective pH electrode                                                | Follow the cleaning procedure. If this doesn't work replace the electrode                                                                              |
| The reading drifts                                                                                     | Defective pH electrode                                                | Replace the electrode                                                                                                                                  |
| Display shows:<br> | Out of range-pH scale                                                 | a) Check the calibration<br>b) Assure the pH sample is in the range 0 to 14<br>c) Check the level of electrolyte and the state of the electrode itself |
| Display shows:<br> | Out of range-°C scale                                                 | Make sure the °C is within 0-100° and temperature probe is plugged                                                                                     |
| Display shows:<br> | Out of range-mV scale or ION for pH301                                | Electrode not connected                                                                                                                                |
| Display shows:<br>"WRONG $\frac{1}{2}$ "<br>and/or<br>"WRONG $\downarrow$ "                            | Erroneous buffer solution used for offset cal.<br>Defective electrode | Make sure the buffer solution used corresponds to the selected buffer value and replace if necessary                                                   |
| Display shows:<br>"WRONG $\frac{2}{2}$ "<br>and/or<br>"WRONG $\downarrow$ "                            | Erroneous buffer solution used for slope cal.                         | Replace the electrode                                                                                                                                  |
|                                                                                                        | Defective electrode                                                   | Use fresh buffer solution                                                                                                                              |
|                                                                                                        |                                                                       | Replace the electrode                                                                                                                                  |

## ELECTRODE CONDITIONING AND MAINTENANCE



### **PREPARATION**

Remove the protective cap.

**DO NOT BE ALARMED IF ANY SALT DEPOSITS ARE PRESENT.**

This is normal with electrodes and they will disappear when rinsed with water.

During transport tiny bubbles of air may have formed inside the glass bulb. The electrode cannot function properly under these conditions. The bubbles can be removed by "shak-

ing down" the electrode as you would do with a glass thermometer.

If the bulb and/or junction are dry, soak the electrode in **HI70300 or HI80300 Storage Solution** for at least one hour.

### ***For refillable electrodes:***

If the filling solution (electrolyte) is more than 1 cm (1/2") below the fill hole, add **HI7082 or HI8082 3,5M KCl Electrolyte Solution** for double junction or **HI7071 or HI8071 3,5M KCl+AgCl Electrolyte Solution** for single junction electrodes.

For a faster response, unscrew the fill hole screw during measurements.

### ***For AmpHel® electrodes:***

If the electrode does not respond to pH changes, the battery is run down and the electrode should be replaced.

### **MEASUREMENT**

Rinse the electrode tip with distilled water.

Immerse the tip (4 cm /1 1/2") in the sample and stir gently for at least 30 seconds.

For a faster response and to avoid cross contamination of the samples, rinse the electrode tip with a few drops of the solution to be tested, before taking measurements.

### **STORAGE**

To minimize clogging and assure a quick response time, the glass bulb and the junction should be kept moist and not allowed to dry out.

Replace the solution in the protective cap with a few drops of **HI70300 or HI80300 Storage Solution** or, in its absence, **Filling Solution (HI7071 or HI8071 for single junction or HI7082 or HI8082 for double junction**

electrodes). Follow the Preparation Procedure above before taking measurements.

**Note:** NEVER STORE THE ELECTRODE IN DISTILLED WATER OR DRY.

### **PERIODIC MAINTENANCE**

Inspect the electrode and the cable. The cable used for the connection to the meter must be intact and there must be no points of broken insulation on the cable or cracks on the electrode stem or bulb. Connectors must be perfectly clean and dry.

If any scratches or cracks are present, replace the electrode.

Rinse off any salt deposits with water.

#### ***For refillable electrodes:***

Refill the reference chamber with fresh electrolyte (**HI7071 or HI8071** for single junction or **HI7082 or HI8082** for double junction electrodes). Allow the electrode to stand upright for 1 hour.

Follow the Storage Procedure above.

### **CLEANING PROCEDURE**

General Soak in Hanna **HI7061 or HI8061 General Cleaning Solution** for approximately 1 hour.

Removal of film, dirt or deposits on the membrane/junction:

- *Protein* Soak in Hanna **HI7073 or HI8073 Protein Cleaning Solution** for 15 minutes.
- *Inorganic* Soak in Hanna **HI7074 or HI8074 Inorganic Cleaning Solution** for 15 minutes.
- *Oil/grease* Rinse with Hanna **HI7077 or HI8077 Oil and Fat Cleaning Solution**.

**IMPORTANT:** After performing any of the cleaning procedures rinse the electrode thoroughly with distilled water, refill the reference chamber with fresh electrolyte, (not necessary for GEL filled electrodes) and soak the electrode in **HI70300 or HI80300 Storage Solution** for at least 1 hour before taking measurements.

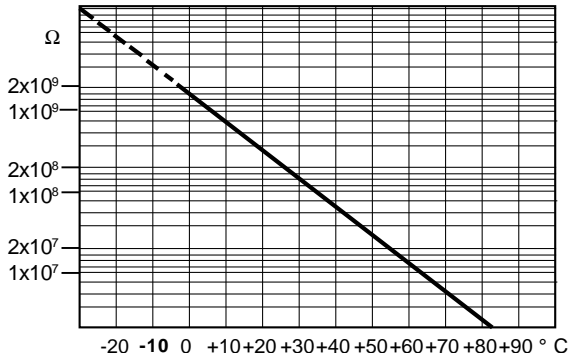
### **TROUBLESHOOTING**

Evaluate your electrode performance based on the following.

- **Noise** (Readings fluctuate up and down) could be due to:
  - **Clogged/Dirty Junction:** Refer to the Cleaning Procedure above.
  - **Loss of shielding** due to low electrolyte level (in refillable electrodes only): refill with fresh **HI7071 or HI8071** for single junction or **HI7082 or HI8082** for double junction electrodes.
- **Dry Membrane/Junction:** Soak in **Storage Solution HI70300 or HI80300** for at least 1 hour.
- **Drifting:** Soak the electrode tip in warm Hanna Solution **HI7082 or HI8082** for one hour and rinse tip with distilled water. Refill with fresh **HI7071 or HI8071** for single junction electrodes and **HI7082 or HI8082** for double junction electrodes.
- **Low Slope:** Refer to the cleaning procedure above.
- **No Slope:** Check the electrode for cracks in glass stem or bulb and replace the electrode.
- **Slow Response/Excessive Drift:** Soak the tip in Hanna Solution **HI7061 or HI8061** for 30 minutes, rinse thoroughly in distilled water and then follow the Cleaning Procedure above.

**TEMPERATURE-RESISTANCE CORRELATION FOR HANNA pH SENSITIVE GLASS**

The resistance of glass electrodes partially depends on the temperature. The lower the temperature, the higher the resistance. It takes longer for the reading to stabilize if the resistance is higher. In addition, the response time will suffer to a greater degree at tem-



peratures below 10°C.

Since the resistance of the pH electrode is in the range of 200 Mohm, the current across the membrane is in the pico Ampere range. Large currents can disturb the calibration of the electrode for hours.

For these reasons **high humidity environments, short circuits and static discharges** are detrimental for a stable pH reading.

The life of a pH electrode also depends on temperature. If constantly used at high temperatures, electrode life is drastically reduced.

| Typical Electrode Life |                    |
|------------------------|--------------------|
| Ambient Temperature    | 1- 3 years         |
| 90 °C                  | Less than 4 months |
| 120°C                  | Less than 1 month  |

High concentrations of sodium ions interfere with readings in alkaline solutions; the pH at which the interference starts to be significant depends upon the composition of the glass. This interference is the alkaline error and causes the pH to be underestimated. Hanna's glass formulations have the indicated characteristics.

**Alkaline Error**

| Sodium Ion Correction for the Glass at 20-25°C |       |       |
|------------------------------------------------|-------|-------|
| Concentration                                  | pH    | Error |
| 0.1 Mol L <sup>-1</sup> Na <sup>+</sup>        | 13.00 | 0.10  |
|                                                | 13.50 | 0.14  |
|                                                | 14.00 | 0.20  |
| 1.0 Mol L <sup>-1</sup> Na <sup>+</sup>        | 12.50 | 0.10  |
|                                                | 13.00 | 0.18  |
|                                                | 13.50 | 0.29  |
|                                                | 14.00 | 0.40  |

**ADDITIONAL INFORMATION ABOUT  
INTERFACE WITH PC  
(for technical personnel only)**

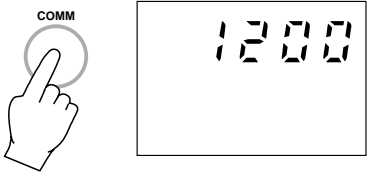
If you are not using Hanna Instruments **HI92000** application software, please find here below some additional information to help your connection to the PC.

**SETTING THE BAUD RATE AND THE COMMAND PREFIX**

The transmission speed (baud rate) of your pH meter and of the external device must be the same.

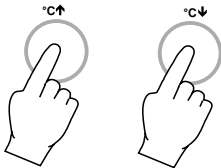
**Procedure for pH 300:**

To set the baud rate of the meter press COMM, the primary LCD shows the current **baud rate**.

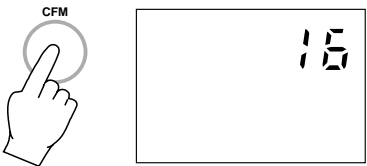


The following baud rate can be selected through UP and DOWN:

150, 300, 600, 1200 (factory setting) and 2400.

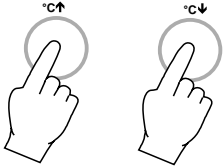


Press CFM to confirm the setting and the primary LCD shows the current **command prefix**: 16 is the factory setting.



**Note:** the Command Prefix has not to be changed using **HI92000** Hanna Software.

Select a different command prefix (between 0 to 47 in decimal) by pressing UP and DOWN.

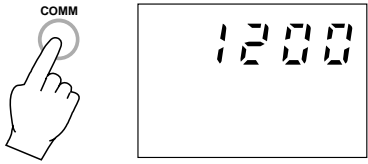


Press CFM to confirm the setting.



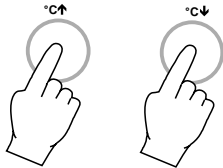
**Procedure for pH 301:**

To set the baud rate of the meter press COMM, the primary LCD shows the current **baud rate**.

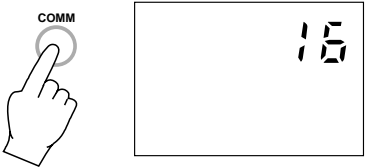


The following baud rate can be selected through UP and DOWN:

150, 300, 600, 1200 (factory setting), 2400, 4800, 9600.

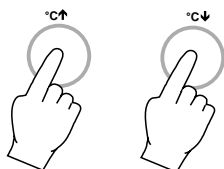


Press COMM to confirm the setting and the primary LCD shows the current **command prefix**: 16 is the factory setting.



**Note:** the Command Prefix has not to be changed using **HI92000** Hanna Software.

Select a different command prefix (between 0 to 47 in decimal) by pressing UP and DOWN.



Press COMM to confirm the setting.



**Procedure for pH 302:**

See program #9 (page 79).

**SENDING COMMANDS FROM PC**

With terminal programs such as, for example, Telix®, Windows Terminal®, it is possible to remotely control your pH meter. Use **HI920010** cable to connect the meter to the PC, start the terminal program and set the communication options as follows: 8, N, 1, no flow control.

**Command Types**

To send a command to the pH meter the scheme is:

<DLE> <command> <CR>

This line makes the computer send a Data Link Escape character, the command expressed as a number or a 3-character sequence) and a CR character.

**Note:** Windows Terminal® and all the other terminal programs that support the ANSI escape sequence, represent the DLE character by the string '^P' and the CR character by the string '^M'. E.g. the line '^PPHR^M' sets the range to pH.

Windows Terminal® are registered Trademark of "Microsoft Co."  
 TELIX® is registered Trademark of "Deltacomm"

**For pH 300:**

**Commands not requiring an answer from the pH meter:**

- PHR** sets the range to pH
- MVR** sets the range to mV
- CAL** is equivalent to pressing the CAL key
- CON** is equivalent to pressing the CFM key
- UPC** is equivalent to pressing the ↑°C key
- DWC** is equivalent to pressing the ↓°C key
- MEM** is equivalent to pressing the MEM key
- MRR** is equivalent to pressing the MR key
- COM** is equivalent to pressing the COMM key

**Commands requiring an answer:**

- pH?** Causes the meter to send the pH value. If the reading is out of range "Err 1" is sent.
- mV?** Causes the meter to send the mV value. If the reading is out of range "Err 2" is sent.
- TM?** Causes the meter to send the temperature value. If the reading is out of range "Err 3" is sent.
- FA?** Requests the meter to send the calibration factor of pH. The order of data is as follows:
  - 1) Month, day and Year (when the calibration was done)  
E.g. "123195" for 31st of Dec. 95
  - 2) Buffer used when the offset was done  
E.g. "0701" for 7.01 pH
  - 3) Offset in mV  
E.g. "\_00504" for 50.4 mV  
"-00504" for 50.4 mV
  - 4) Buffer used when slope was done  
E.g. "0401" for 4.01 pH
  - 5) Slope in mV  
E.g. "000592" for 59.2 mV
  - 6) Temperature  
E.g. "\_01199" for 119.9°C  
"-00099" for -9.9°C

**BAR** Requests the meter to send the RS232 baud rate



**PRE** Requests the meter to send the RS232 command prefix

**Commands setting parameters:**

**/BR** To set the RS232 baud rate. E.g.  
send "/BR0" to set the meter to baud rate of 150  
send "/BR1" to set the meter to baud rate of 300  
send "/BR2" to set the meter to baud rate of 600  
send "/BR3" to set the meter to baud rate of 1200  
send "/BR4" to set the meter to baud rate of 2400

**/PF** To set the RS232 command prefix. E.g.  
send "/PF05" to set the command prefix to 05.

**For pH 301:**

**Commands not requiring an answer from the pH meter:**

**PHR** sets the range to pH  
**PPM** sets the range to ppm  
**MVR** sets the range to mV  
**OFF** is equivalent to pressing the OFF key

**Commands requiring an answer:**

**pH?** Causes the meter to send the pH value. If the reading is out of range "Err 1" is sent.

**pM?** Causes the meter to send the ppm value. If the reading is out of range "Err 5" is sent.

**MV?** Causes the meter to send the mV value. If the reading is out of range "Err 2" is sent.

**TM?** Causes the meter to send the temperature value. If the reading is out of range "Err 3" is sent.

The meter will send "Err6" if in a different measurement range.

**FA?** Requests the meter to send the calibration factor of pH. The order of data is as follows:

- 1) Month, day and Year  
(when the calibration was done)  
E.g. "123195" for 31st of Dec. 95
- 2) Time (when the calibration was done)  
E.g. "1259" for 12:59 hh/mm
- 3) Buffer used when the offset was done  
E.g. "0701" for 7.01 pH
- 4) Offset in mV  
E.g. "\_00504" for 50.4 mV  
"-00504" for -50.4 mV
- 5) Buffer used when 1st slope was done  
E.g. "0401" for 4.01 pH
- 6) 1st slope in mV  
E.g. "000592" for 59.2 mV
- 7) Buffer used when 2nd slope was done  
E.g. "1001" for 10.01 pH
- 8) 2nd slope in mV  
E.g. "000569" for 56.9 mV
- 9) Temperature  
E.g. "\_01105" for 110.5°C  
"-00099" for -9.9°C

**FI?** Requests the meter to send the calibration factor of ION. The order of data is as follows:

- 1) Month, day and Year  
(when the calibration was done)  
E.g. "060395" for 6th of March 95
- 2) Time (when the calibration was done)  
E.g. "1651" for 16:51 hh/mm
- 2) Buffer used when the offset was done  
E.g. "000100" for 10.0ppm
- 3) Offset in mV  
E.g. "000234" for 23.4 mV
- 4) Buffer used when slope was done  
E.g. "010000" for 1000 mV
- 5) mV measured when the slope was done  
E.g. "012345" for 1234.5 mV
- 6) Temperature  
E.g. "\_00105" for 10.5°C  
"-00099" for -9.9°C

**DA?** Requests the meter to send the date  
E.g. "022896" for 28th Feb. 96

**TI?** Requests the meter to send the time

E.g. "233001"

for 23:30 hr, 1 sec. as interval

"233002"

for 23:30 hr, 15 sec. as interval

"233003"

for 23:30 hr, 30 sec. as interval

"233004"

for 23:30 hr, 1 min. as interval

"233005"

for 23:30 hr, 5 min. as interval

"233006"

for 23:30 hr, 30 min. as interval

"233007"

for 23:30 hr, 60 min. as interval

"233008"

for 23:30 hr, 120 min. as interval

"233009"

for 23:30 hr, 180 min. as interval

**BAR** Requests the meter to send the RS232 baud rate

**PRE** Requests the meter to send the RS232 command prefix

**Commands setting parameters:**

**/BR** To set the RS232 baud rate. E.g.

send "/BR0" to set the meter to baud rate of 150

send "/BR1" to set the meter to baud rate of 300

send "/BR2" to set the meter to baud rate of 600

send "/BR3" to set the meter to baud rate of 1200

send "/BR4" to set the meter to baud rate of 2400

send "/BR5" to set the meter to baud rate of 4800

send "/BR6" to set the meter to baud rate of 9600

**/PF** To set the RS232 command prefix. E.g.

send "/PF05" to set the command prefix to 05.

**For pH 302:**

**Commands not requiring an answer from the pH meter:**

**PHR** sets the range to pH

**MVR** sets the range to mV

**CAL** is equivalent to pressing the CAL key

**CFM** is equivalent to pressing the CFM key

**PRT** is equivalent to pressing the PRINT key

**PGM** is equivalent to pressing the PGM key

**CLR** is equivalent to pressing the CLEAR key

**OFF** is equivalent to pressing the OFF key

**Commands requiring an answer:**

**pH?** Causes the meter to send the pH value. If the reading is out of range "Err 1" is sent.

**mV?** Causes the meter to send the mV value. If the reading is out of range "Err 2" is sent.

**TM?** Causes the meter to send the temperature value. If the reading is out of range "Err 3" is sent.

The meter will send "Err6" if in a different measurement range.

**FA?** Requests the meter to send the calibration factor of pH. The order of data is as follows:

- 1) Month, day and Year  
(when the calibration was done)  
E.g. "123195" for 31st of Dec. 95
- 2) Buffer used when the offset was done  
E.g. "0701" for 7.01 pH
- 3) Offset in mV  
E.g. "\_00504" for 50.4 mV  
"-00504" for 50.4 mV
- 4) Buffer used when slope was done  
E.g. "0401" for 4.01 pH
- 5) Slope in mV  
E.g. "000592" for 59.2 mV
- 6) Temperature  
E.g. "\_01199" for 119.9°C  
"-00099" for -9.9°C

**DA?** Requests the meter to send the date status (MMDD)

**TI?** Requests the meter to send the time status (HHMM)

***Commands setting parameters:***

**/BR** To set the RS232 baud rate. E.g.  
send "/BR0" to set the meter to baud rate of 150  
send "/BR1" to set the meter to baud rate of 300  
send "/BR2" to set the meter to baud rate of 600  
send "/BR3" to set the meter to baud rate of 1200  
send "/BR4" to set the meter to baud rate of 2400  
send "/BR5" to set the meter to baud rate of 4800  
send "/BR6" to set the meter to baud rate of 9600

**/PF** To set the RS232 command prefix.  
E.g. send "/PF05" to set the command prefix to 05.

***For all models***

**Note:** <ACK> will be sent by the meter if the command received is accepted, otherwise it will send <CAN>.  
<ACK> equals to ASCII code 06 and  
<CAN> equals to ASCII code 24.

These commands may be sent with either capital or small letters. Invalid commands will be ignored. The characters sent by the pH meter are always capital letters.

**ACCESSORIES**

**pH CALIBRATION SOLUTIONS**

**HI774P** pH 4.01 & 7.01 Buffer Solution, 30 mL each  
**HI7004M** pH 4.01 Buffer Solution, 230 mL  
**HI7004L** pH 4.01 Buffer Solution, 460 mL  
**HI7006M** pH 6.86 Buffer Solution, 230 mL  
**HI7006L** pH 6.86 Buffer Solution, 460 mL  
**HI777P** pH 7.01 Buffer Sol. 2x30 mL  
**HI7007M** pH 7.01 Buffer Solution, 230 mL  
**HI7007L** pH 7.01 Buffer Solution, 460 mL  
**HI7009M** pH 9.18 Buffer Solution, 230 mL  
**HI7009L** pH 9.18 Buffer Solution, 460 mL  
**HI7710P** pH 7.01 & 10.01 Buffer Solution, 30 mL each  
**HI7010M** pH 10.01 Buffer Solution, 230 mL  
**HI7010L** pH 10.01 Buffer Sol., 460 mL

**pH CALIBRATION SOLUTIONS IN FDA APPROVED BOTTLE**

**HI8004L** pH 4.01 Buffer Solution, 460 mL  
**HI8006L** pH 6.86 Buffer Solution, 460 mL  
**HI8007L** pH 7.01 Buffer Solution, 460 mL  
**HI8009L** pH 9.18 Buffer Solution, 460 mL  
**HI8010L** pH 10.01 Buffer Solution, 460 mL

**ELECTRODE STORAGE SOLUTIONS**

**HI70300M** Storage Solution, 230 mL  
**HI70300L** Storage Solution, 460 mL

**ELECTRODE STORAGE SOLUTIONS IN FDA APPROVED BOTTLE**

**HI80300M** Storage Solution, 230 mL  
**HI80300L** Storage Solution, 460 mL

**ELECTRODE CLEANING SOLUTIONS**

**HI7061M** General Cleaning Sol., 230 mL

|                |                                 |
|----------------|---------------------------------|
| <b>HI7061L</b> | General Cleaning Sol., 460 mL   |
| <b>HI7073M</b> | Protein Cleaning Sol., 230 mL   |
| <b>HI7073L</b> | Protein Cleaning Sol., 460 mL   |
| <b>HI7074M</b> | Inorganic Cleaning Sol., 230 mL |
| <b>HI7074L</b> | Inorganic Cleaning Sol., 460 mL |
| <b>HI7077M</b> | Oil & Fat Cleaning Sol., 230 mL |
| <b>HI7077L</b> | Oil & Fat Cleaning Sol., 460 mL |

**ELECTRODE CLEANING SOLUTIONS  
IN FDA APPROVED BOTTLE**

|                |                                     |
|----------------|-------------------------------------|
| <b>HI8061M</b> | General Cleaning Solution, 230 mL   |
| <b>HI8061L</b> | General Cleaning Solution, 460 mL   |
| <b>HI8073M</b> | Protein Cleaning Solution, 230 mL   |
| <b>HI8073L</b> | Protein Cleaning Solution, 230 mL   |
| <b>HI8077M</b> | Oil & Fat Cleaning Solution, 230 mL |
| <b>HI8077L</b> | Oil & Fat Cleaning Solution, 460 mL |

**REFILLING ELECTROLYTE SOLUTIONS**

|               |                                                                      |
|---------------|----------------------------------------------------------------------|
| <b>HI7071</b> | 3.5M KCl + AgCl Electrolyte, 4x50 mL, for single junction electrodes |
| <b>HI7072</b> | 1M KNO <sub>3</sub> Electrolyte, 4x50 mL                             |
| <b>HI7082</b> | 3.5M KCl Electrolyte, 4x50 mL, for double junction electrodes        |

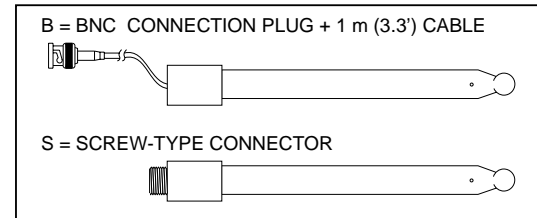
**REFILLING ELECTROLYTE SOLUTIONS  
IN FDA APPROVED BOTTLE**

|               |                                                                      |
|---------------|----------------------------------------------------------------------|
| <b>HI8071</b> | 3.5M KCl + AgCl Electrolyte, 4x50 mL, for single junction electrodes |
| <b>HI8072</b> | 1M KNO <sub>3</sub> Electrolyte, 4x50 mL                             |
| <b>HI8082</b> | 3.5M KCl Electrolyte, 4x50 mL, for double junction electrodes        |

**ORP PRETREATMENT SOLUTIONS**

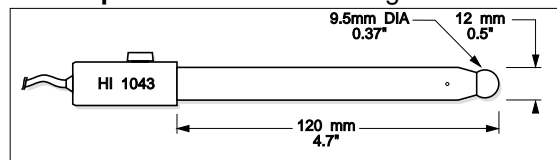
|                |                                  |
|----------------|----------------------------------|
| <b>HI7091M</b> | Reducing Pretreat. Sol., 230 mL  |
| <b>HI7091L</b> | Reducing Pretreat. Sol., 460 mL  |
| <b>HI7092M</b> | Oxidizing Pretreat. Sol., 230 mL |
| <b>HI7092L</b> | Oxidizing Pretreat. Sol., 460 mL |

**pH & ORP ELECTRODES**



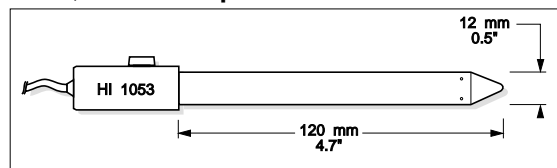
**HI1043B / HI1040S**

Glass-body, double junction, refillable, combination pH electrode. Use: strong acid/alkali.



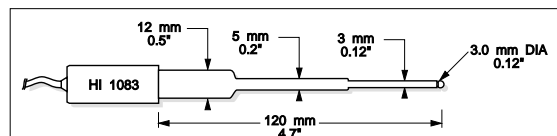
**HI1053B / HI1050S**

Glass-body, triple ceramic, conic shape, refillable, combination pH electrode. Use: emulsions.



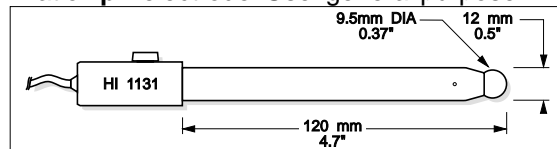
**HI1083B**

Glass-body, micro, Viscolene, nonrefillable, combination pH electrode. Use: biotechnology, micro titration.



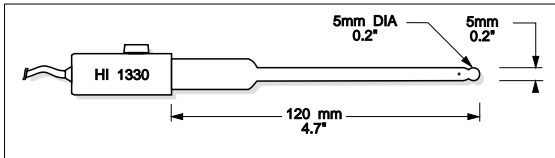
**HI1131B / HI1111S**

Glass-body, single junction, refillable, combination pH electrode. Use: general purpose.



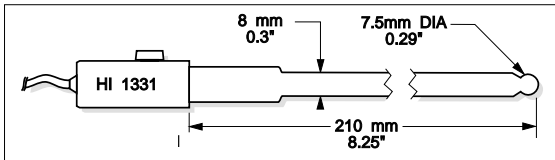
### HI 1330B / HI 1310S

Glass-body, semimicro, single junction, refillable, combination pH electrode. Use: laboratory.



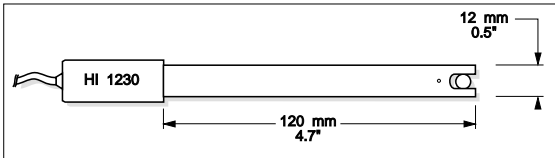
### HI 1331B / HI 1311S

Glass-body, semimicro, single junction, refillable, combination pH electrode. Use: flasks.



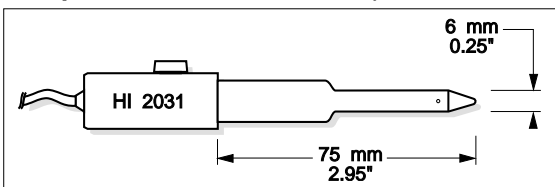
### HI 1230B / HI 1210S

Plastic-body (Ultem®), double junction, gel-filled, combination pH electrode. Use: general purpose.



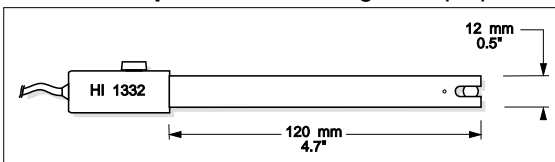
### HI 2031B / HI 2020S

Glass-body, semimicro, conic, refillable, combination pH electrode. Use: semisolid products.



### HI 1332B / HI 1312S

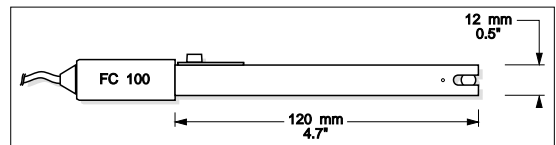
Plastic-body (Ultem®), double junction, refillable, combination pH electrode. Use: general purpose.



Ultem® is registered Trademark of "General Electrics Co."

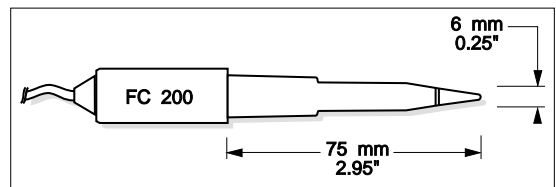
### FC 100B

Plastic-body (Kynar®), double junction, refillable, combination pH electrode. Use: general purpose for food industry.



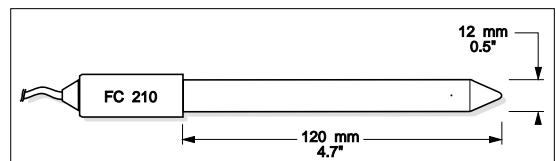
### FC 200B / FC 200S

Plastic-body (Kynar®), single junction, conic, Viscolene, refillable, combination pH electrode. Use: meat & cheese.



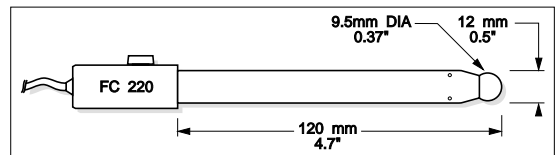
### FC 210B

Glass-body, double junction, conic, Viscolene, combination pH electrode. Use: milk, yogurt.



### FC 220B

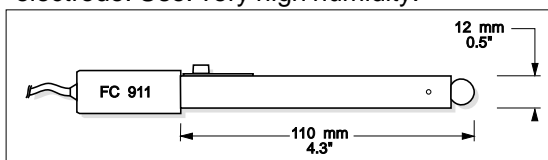
Glass-body, single junction, refillable, combination pH electrode. Use: food & wine processing.



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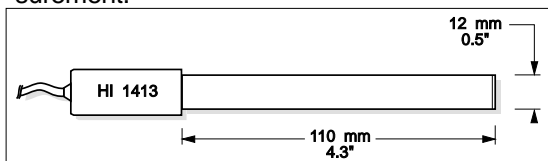
### FC911B

Plastic-body (Kynar®), double junction, refillable with built-in amplifier, combination pH electrode. Use: very high humidity.



### HI1413B / HI1410S

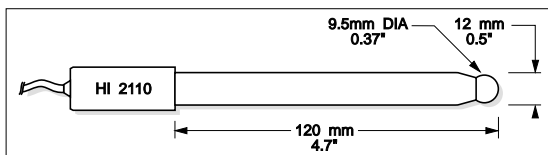
Glass-body, single junction, flat tip, Viscolene, combination pH electrode. Use: surface measurement.



### Half-cell electrodes:

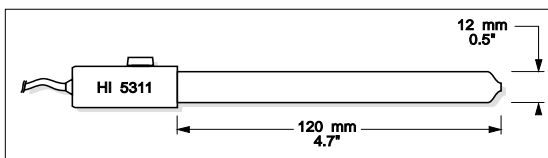
#### HI2110B

Glass-body, single half-cell pH electrode. Use: general purpose.



#### HI5311

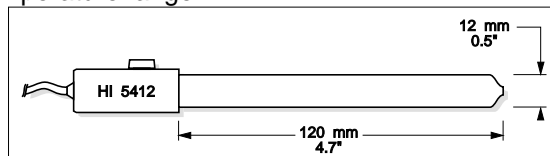
Glass-body, Ag/AgCl reference half-cell electrode, double junction, refillable with 4mm plug with 1m (3.3') cable. Use: general purpose with wide temperature range.



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### HI5412

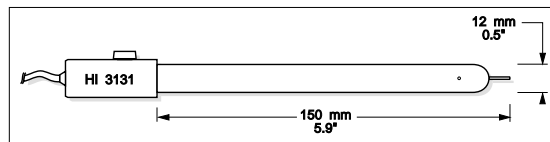
Glass-body, single Calomel reference half-cell electrode, refillable with 4mm plug with 1m (3.3') cable. Use: general purpose with constant temperature range.



### ORP electrodes:

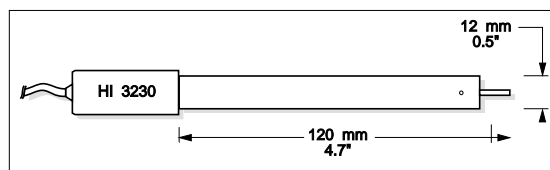
#### HI3131B / HI3111S

Glass-body, refillable, combination platinum ORP electrode. Use: titration.



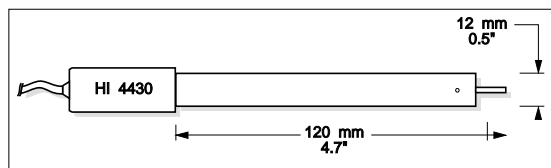
#### HI3230B / HI3210S

Plastic-body (Ultem®), gel-filled, combination platinum ORP electrode. Use: general purpose.



#### HI4430B / HI4410S

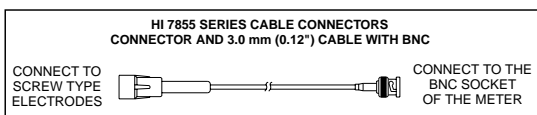
Plastic-body (Ultem®), gel-filled, combination gold ORP electrode. Use: general purpose.



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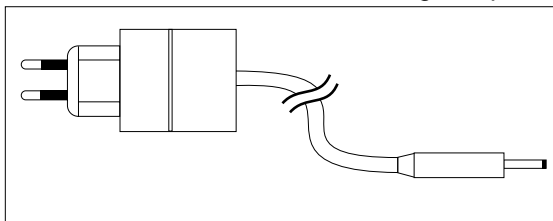
**EXTENSION CABLES FOR SCREW-TYPE ELECTRODES ONLY (SCREW TO BNC CONNECTOR)**

- HI7855/1** Extension cable 1m (3.3') long  
**HI7855/3** Extension cable 3m (9.9') long  
**HI7855/5** Extension cable 5m (16.5') long  
**HI7855/10** Extension cable 10m (33') long  
**HI7855/15** Extension cable 15m (49.5') long



**POWER UNITS**

- HI710005** 115VAC-12VDC voltage adapter  
**HI710006** 230VAC-12VDC voltage adapter



**OTHER ACCESSORIES**

- ChecktempC** Thermometer with penetration probe (range -50.0 to 150.0°C)  
**HI76405** Electrode holder  
**HI7669/2W** Temperature probe with 1 m (3.3') screened cable  
**HI710032** Pack of 10 plain paper spare rolls (for **pH 302** only)  
**HI710033** Replacement ink cartridge (for **pH 302** only)  
**HI92000** Windows® compatible application software  
**HI920010** 9 to 25-pin PC connection cable  
**HI920010/9** 9 to 9-pin PC connection cable  
**MANpH300R1** Instruction manual

Windows® is registered Trademark of "Microsoft Co."

**ELECTRODE APPLICATION REFERENCE GUIDE**

| Application                                    | Electrodes                                                                     |
|------------------------------------------------|--------------------------------------------------------------------------------|
| 1. Aquarium                                    | HI 1332B, HI 1911B, HI 1312S                                                   |
| 2. Bath-water                                  | HI 1910B, HI 1130B, HI 1110S                                                   |
| 3. Beer                                        | HI 1131B, HI 1111S                                                             |
| 4. Bread                                       | HI 2031B, FC 200B, HI 2020S, FC 200S                                           |
| 5. Cheese                                      | FC 200B, FC 200S                                                               |
| 6. Dairy products                              | FC 911B, FC 100B                                                               |
| 7. Dirty water                                 | HI 1910B, HI 1912B                                                             |
| 8. Emulsions                                   | HI 1053B, HI 1050S                                                             |
| 9. Environment                                 | HI 1230B, HI 1210S                                                             |
| 10. Flasks                                     | HI 1331B, HI 1310S                                                             |
| 11. Food industry general use                  | FC 911B, FC 100B                                                               |
| 12. Fruit                                      | FC 200B, FC 220B, FC 200S                                                      |
| 13. Fruit juices, organic                      | FC 210B                                                                        |
| 14. Galvanizing waste solution                 | HI 1130B, HI 1912B, HI 1110S                                                   |
| 15. Heavy-duty applications                    | HI 1135B, HI 1115S                                                             |
| 16. High purity water                          | HI 1053B, HI 1050S                                                             |
| 17. Horticulture                               | HI 1053B, FC 200B, HI 1050S, FC 200S                                           |
| 18. In-line applications                       | HI 1134B, HI 1135B, HI 2114B, HI 2910B, HI 1114S, HI 1115S                     |
| 19. Laboratory general use                     | HI 1131B, HI 1230B, HI 1332B, HI 1330B, HI 1111S, HI 1210S, HI 1312S, HI 1310S |
| 20. Leather                                    | HI 1413B, HI 1410S                                                             |
| 21. Lemon juice                                | FC 100B                                                                        |
| 22. Meat                                       | FC 200B, HI 2031B, FC 200S, HI 2020S                                           |
| 23. Micro plate sampling of less than 100 mL   | HI 1083B, HI 1080S                                                             |
| 24. Milk and Yogurt                            | FC 210B                                                                        |
| 25. Paints                                     | HI 1053B, HI 1050S                                                             |
| 26. Paper                                      | HI 1413B, HI 1410S                                                             |
| 27. Photographic chemicals                     | HI 1230B, HI 1210S                                                             |
| 28. Quality control                            | HI 1332B, HI 1312S                                                             |
| 29. Sausages                                   | FC 200B, HI 2031B, FC 200S, HI 2020S                                           |
| 30. Semisolid products                         | HI 2031B, HI 2020S                                                             |
| 31. Skin                                       | HI 1413B, HI 1410S                                                             |
| 32. Soil samples                               | HI 1230B, HI 1210S                                                             |
| 33. Solvents                                   | HI 1043B, HI 1040S                                                             |
| 34. Strong acid                                | HI 1043B, HI 1040S                                                             |
| 35. Submersion application                     | HI 1130B, HI 1110S                                                             |
| 36. Surface measurements                       | HI 1413B, HI 1410S                                                             |
| 37. Swimming pool                              | HI 1130B, HI 2114B, HI 2910B                                                   |
| 38. Titrations with constant temperature range | HI 1131B, HI 1111S                                                             |
| 39. Titrations with wide temperature range     | HI 1131B, HI 1111S                                                             |
| 40. Very high humidity                         | FC 911B, HI 1912B, HI 1911B                                                    |
| 41. Vials and test tube                        | HI 1330B, HI 1310S                                                             |
| 42. Wine processing                            | FC 220B                                                                        |

B = BNC connection plug

S = Screw-type connection plug

## WARRANTY

All Hanna Instruments **are warranted for two years** against defects in workmanship and materials when used for their intended purpose and maintained according to the instructions.

**The probes and the electrodes are warranted for a period of six months.**

Damages due to accident, misuse, tampering or lack of prescribed maintenance are not covered. This warranty is limited to repair or replacement free of charge of the meter only, whenever due to defect of manufacturing.


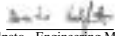
If service is required, contact the dealer from whom you purchased the instrument. If under warranty, report the model number, date of purchase, serial number and the nature of the failure. If the repair is not covered by the warranty, you will be notified of the charge for repair or replacement. If the instrument is to be returned to Hanna Instruments, obtain a Return Goods Authorization from the Customer Service Department first and then send it with shipment cost prepaid. When shipping any instrument, make sure it is properly packaged for complete protection.

To validate your warranty, fill out and return the enclosed warranty card within 14 days from the date of purchase.

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Hanna Instruments reserves the right to modify the design, construction and appearance of its products without advance notice.

## CE DECLARATION OF CONFORMITY

|                                                                                                                                                                                                                                 |                                                                                                                                                                       |                         |           |             |           |                |          |                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|-----------|-------------|-----------|----------------|----------|-------------------|
|                                                                                                                                               |                                                                                                                                                                       |                         |           |             |           |                |          |                   |
| <b>CE</b><br><i>DECLARATION OF CONFORMITY</i>                                                                                                                                                                                   |                                                                                                                                                                       |                         |           |             |           |                |          |                   |
| We<br>Hanna Instruments Srl<br>V.le delle industrie 12<br>35010 Ronchi di Villafranca (PD)<br>ITALY                                                                                                                             |                                                                                                                                                                       |                         |           |             |           |                |          |                   |
| herewith certify that the bench pH meters<br>pH 300 pH 301 pH 302                                                                                                                                                               |                                                                                                                                                                       |                         |           |             |           |                |          |                   |
| have been tested and found to be in compliance with the following regulations:                                                                                                                                                  |                                                                                                                                                                       |                         |           |             |           |                |          |                   |
| <table><tr><td>IEC 801-2</td><td>Electrostatic Discharge</td></tr><tr><td>IEC 801-3</td><td>RF Radiated</td></tr><tr><td>IEC 801-4</td><td>Fast Transient</td></tr><tr><td>EN 55022</td><td>Radiated, Class B</td></tr></table> | IEC 801-2                                                                                                                                                             | Electrostatic Discharge | IEC 801-3 | RF Radiated | IEC 801-4 | Fast Transient | EN 55022 | Radiated, Class B |
| IEC 801-2                                                                                                                                                                                                                       | Electrostatic Discharge                                                                                                                                               |                         |           |             |           |                |          |                   |
| IEC 801-3                                                                                                                                                                                                                       | RF Radiated                                                                                                                                                           |                         |           |             |           |                |          |                   |
| IEC 801-4                                                                                                                                                                                                                       | Fast Transient                                                                                                                                                        |                         |           |             |           |                |          |                   |
| EN 55022                                                                                                                                                                                                                        | Radiated, Class B                                                                                                                                                     |                         |           |             |           |                |          |                   |
| Date of Issue: <u>30-05-1996</u>                                                                                                                                                                                                | <br>D. Volpato - Engineering Manager<br>On behalf of<br>Hanna Instruments S.r.l. |                         |           |             |           |                |          |                   |

### Recommendations for Users

Before using these products, make sure that they are entirely suitable for the environment in which they are used.

Operation of these instruments in residential area could cause unacceptable interferences to radio and TV equipments, requiring the operator to take all necessary steps to correct interferences.

The glass bulb at the end of the electrode is sensitive to electrostatic discharges. Avoid touching this glass bulb at all times.

During operation, ESD wrist straps should be worn to avoid possible damage to the electrode by electrostatic discharges.

Any variation introduced by the user to the supplied equipment may degrade the instrument's EMC performance.

To avoid electrical shock, do not use these instruments when voltages at the measurement surface exceed 24VAC or 60VDC.

To avoid damages or burns, do not perform any measurement in microwave ovens.





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07/96



<http://www.hannainst.com>